

56<sup>th</sup>  
Annual



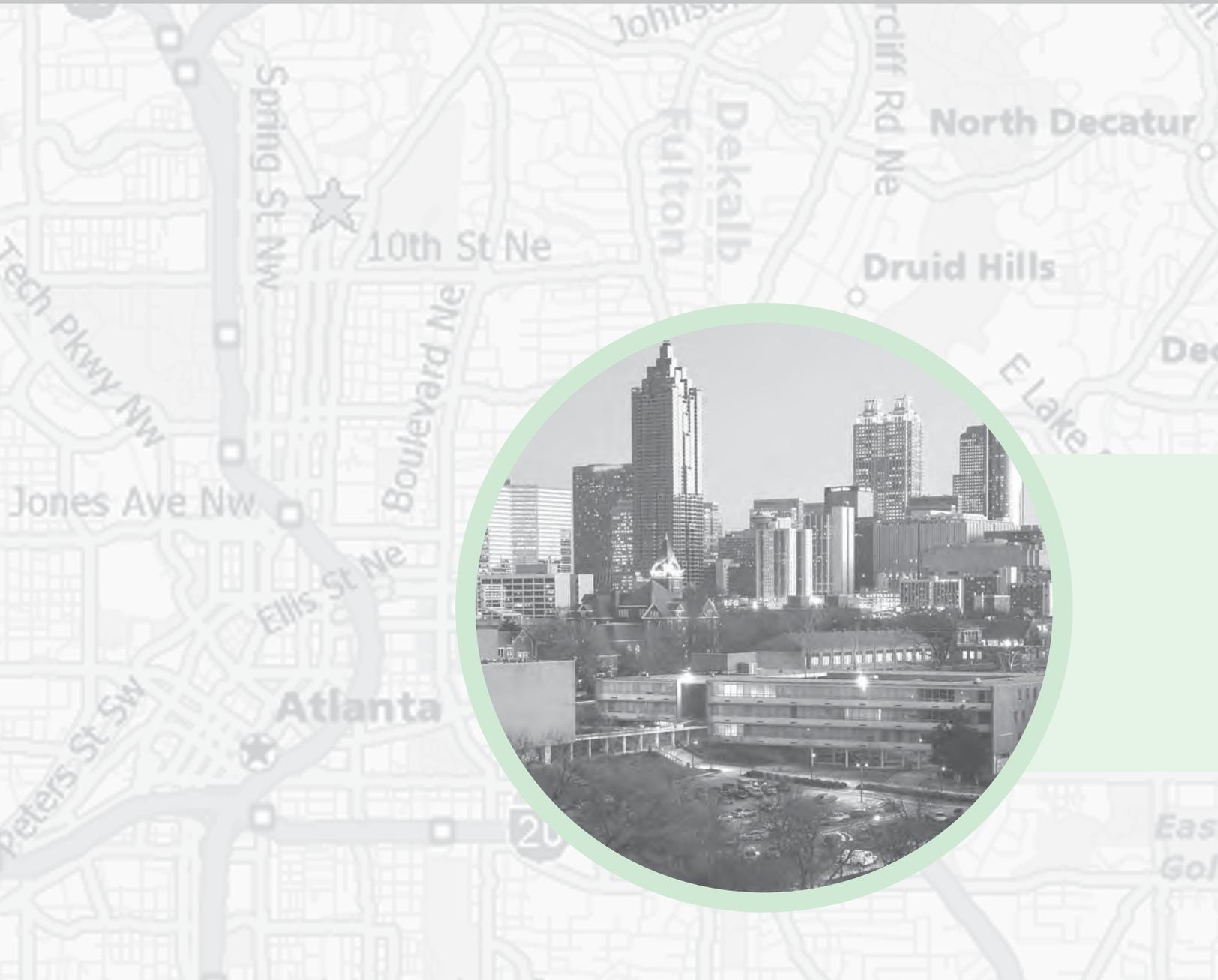
# EIS Conference

Epidemic Intelligence Service



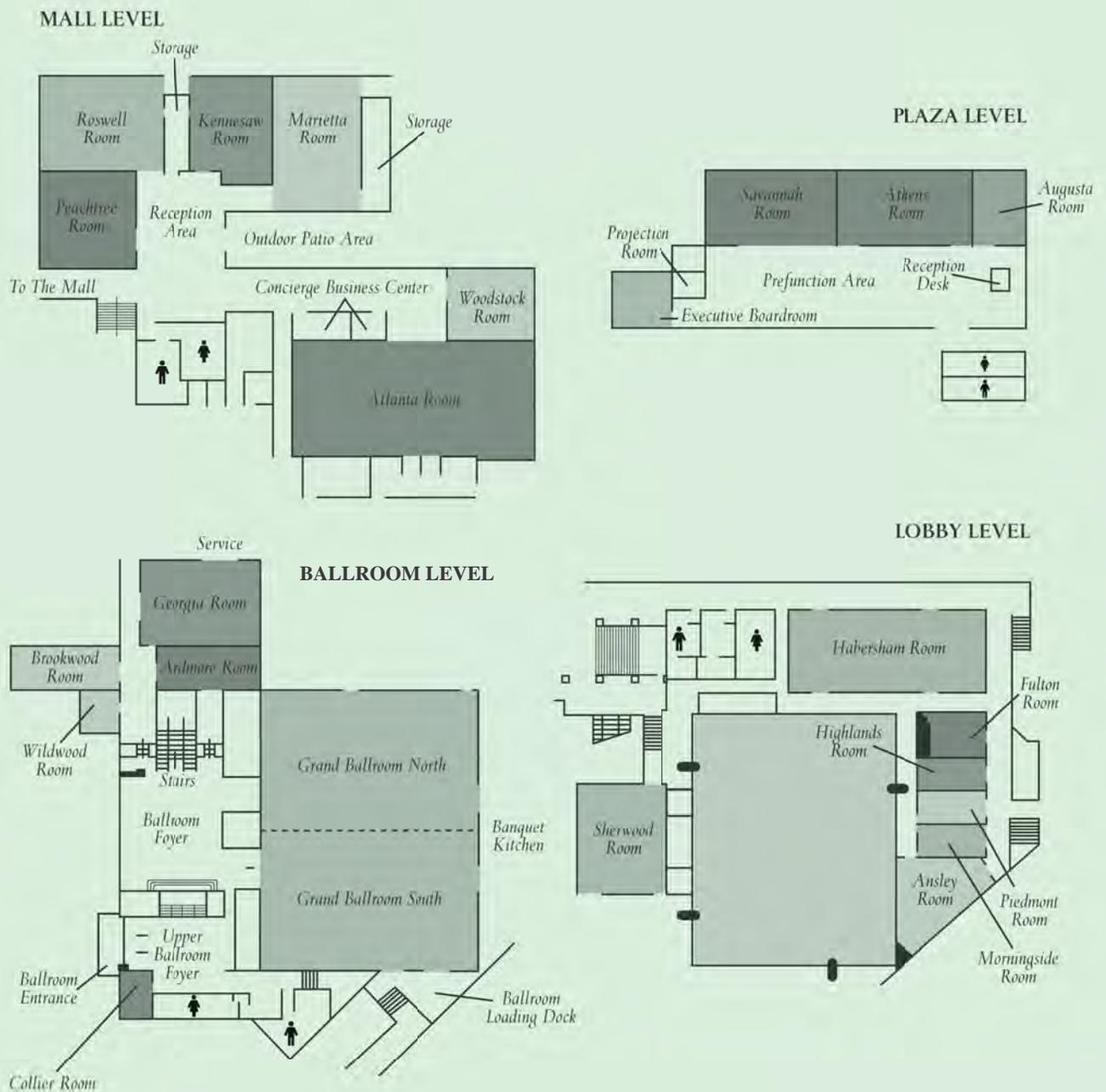
April 16–20, 2007 • Sheraton Midtown Hotel • Atlanta, Georgia





# Sheraton Midtown Hotel

## Floor Plan



56<sup>th</sup>  
Annual

**Epidemic Intelligence Service Conference**  
**Centers for Disease Control and Prevention**  
**April 16–20, 2007**

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# Mark Your Calendars

## **EIS Conference 2008**

57<sup>th</sup> Annual  
Epidemic Intelligence Service (EIS)  
Conference

April 14–18, 2008  
CDC, Atlanta, Georgia



# Dear Friends of EIS:

Welcome to the 56<sup>th</sup> Annual Epidemic Intelligence Service Conference. We are delighted that you are able to attend our annual conference, which highlights the professional activities of EIS officers. The scientific program this year includes 101 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 EIS Conference.



# Preface

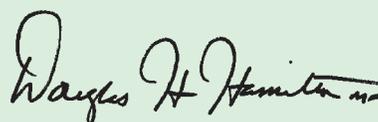
For the last 2 years, in preparing this preface, I have reported the “high profile” activities of EIS officers which were dominated by natural disasters. There was the Tsunami and other floods in 2004, and of course, 2005 was the “year of the hurricane.” This year we dodged the hurricane bullet and the events that made the nightly news most often involved infectious disease outbreaks — many of which you will hear about at the conference. Domestically, there was *E.coli* in spinach, *Salmonella* in peanut butter, and *Fusarium* in contact lens solution. Internationally, several officers worked on the Rift Valley fever outbreak in East Africa or participated in various influenza responses. Speaking of influenza, hopefully, next year I will not be writing about all of the officers who have been deployed in response to the avian influenza pandemic. CDC has been working very hard to get ready for this possibility. EIS staff and officers have participated in several agencywide drills and simulations, and all current officers have participated in a special 3-day influenza training program.

Speaking of the new officers, we extend a special welcome to the incoming members of the EIS Class of 2007. This was a record breaking year in several respects. First, the number of applicants was higher than ever before, and I believe that this is mostly due to the efforts of you, the alumni. Word of mouth still seems to be our most effective recruiting tool, although this year we made use of a number of professional and academic list-servers to get the message out. The second notable achievement is that when this new class is sworn in, in July, we will top the 3,000 mark for the number of people who have been in the program. This year’s 81 “red conference tags” are a select group of men and women with a broad array of interests and skills. Fifty-four (66%) of the new officers are women, and 12 (15%) are citizens of other nations. The countries represented this year are Bangladesh, Britain, Bulgaria, China, Germany, Iraq, Liberia, Nigeria, South Africa, South Korea, Spain, and Taiwan. Among the 69 who are U.S. citizens or permanent residents, 25 (36%) represent racial and ethnic

minority groups. The class includes 44 physicians (51% of whom have other advanced degrees), 26 doctoral-level scientists, four veterinarians, one RN/MPH; and one Physician-Assistant. There are also five dual-doctoral degree candidates, four MD/PhDs and one MD/DVM.

This year we will again be running concurrent oral sessions on Tuesday and Wednesday mornings, so please check your program carefully. There will also be several special sessions in this year’s conference. On Tuesday, there will be a lunchtime session entitled “Extensively Drug-Resistant TB — The Perfect Storm.” There will be a special session on Thursday at lunch focusing on “Preconception Care — Missed Opportunities To Further Improve Perinatal Outcomes.” Finally, on Friday at lunch, there will be a special session on “Too Hot To Handle: Climate Change and Public Health.”

The 2007 Conference provides you with the opportunity to hear about many current applications of epidemiology to public health and prevention by EIS officers. We welcome you to an exciting series of days and evenings in the EIS experience, an opportunity to learn, to meet old and new friends, and to welcome the incoming Officers. I look forward to seeing you during the week.



Douglas Hamilton, MD, PhD  
Director, Epidemic Intelligence Service  
Career Development Division  
Office of Workforce and Career Development



The EIS Program gratefully acknowledges the invaluable assistance and cooperation of Creative Services, the Management Analysis and Services Office, and the editorial and support staff of all CDC administrative units participating in the 2007 EIS Conference.

# Program Committees

## 2007 EIS Conference

### Scientific Program Committee

**Bruce Bernard**, National Institute for Occupational Safety and Health, Chair  
**Jennita Reefhuis**, National Center on Birth Defects and Developmental Disabilities, Co-Chair  
**Lara Akinbami**, National Center for Health Statistics  
**Mick Ballesteros**, National Center for Injury Prevention and Control  
**Diana Bensyl**, Office of Workforce and Career Development  
**Renee Funk**, National Center for Environmental Health/Agency for Toxic Substances and Disease Registry  
**Kashef Ijaz**, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention  
**Ruth Jiles**, National Center for Chronic Disease Prevention and Health Promotion  
**Eric Mintz**, National Center for Zoonotic, Vector-Borne, and Enteric Diseases  
**Pekka Nuorti**, National Center for Immunization and Respiratory Diseases  
**Nancy Sahakian**, National Institute for Occupational Safety and Health  
**Arjun Srinivasan**, National Center for Preparedness, Detection, and Control of Infectious Diseases  
**Jenny Williams**, National Center on Birth Defects and Developmental Disabilities

### Latebreaker Session Committee

**Kashef Ijaz**, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Chair  
**Ruth Jiles**, National Center for Chronic Disease Prevention and Health Promotion  
**Arjun Srinivasan**, National Center for Preparedness, Detection, and Control of Infectious Diseases

### Program Production

**Doug Hamilton**, EIS Program  
**Dorothy N. Jones**, EIS Program  
**Mae Lee**, EIS Program  
**Erica R. Lowe**, EIS Program  
**Lisa N. Pealer**, EIS Program  
**Todd Prydybasz**, Creative Services  
**C. Kay Smith-Akin**, OWCD Science Office  
**Marcia Victor**, EIS Program

### Color Key for Name Tags

**Blue** – EIS Alumni  
**Green** – Current EIS Officers  
**Red** – EIS Recruits  
**Black** – Conference Participants  
**Purple** – Conference Staff  
**Light Blue Dot** – Was/Is Field EIS  
**Orange Dot** – Recruiters  
**Pink Dot** – Media



# 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 their significance to public health, and maintain and increase their skills in determining the appropriateness of epidemiological methods, presenting and interpreting results clearly, and developing appropriate conclusions and recommendations.

## OVERALL CONFERENCE GOALS

- To provide a forum for EIS officers and alumni 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 will be available at the conference registration desk located in front of the Grand Ballroom on the Ballroom level of the hotel. Check-in and onsite registration will be available Monday–Friday, 7:30 a.m.–5:00 p.m.

At registration, you will receive your conference folder with a program book, general information, and your name badge. Please wear your conference badge at all times during the conference. Your name badge includes your code to access messages in the Communications Center. If you lose or misplace your name badge, the staff at the registration desk will assist you in securing a new one.

Conference staff will be wearing purple badges and will be available to provide assistance if you need additional information.

**Nonsmoking Conference:** Smoking is not permitted in any of the conference sessions, hallways, or meeting rooms.

**Cellular Phones and Pagers:** As a courtesy to presenters and all meeting attendees, please turn off telephones and pagers (or turn to silent) during conference sessions. Use of cellular phones is restricted to the meeting room foyers and public areas outside the meeting rooms.

## MESSAGE CENTER

Located in the Georgia Room, the Message Center will handle messaging needs during this year's conference. Please check the large-screen monitors for messages. Messages can be accessed by using your registration number on your name badge.

Computers in the Message Center can also be used to access the Internet for e-mail or the continuing education evaluation forms. Please limit your computer use to 10 minutes at a time, to allow other conference attendees an opportunity to use these services as well.

## SPEAKER READY-ROOM

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

## EXHIBIT HALL

The Exhibit Hall is located in the Ballroom Foyer, and will be open Monday–Thursday, 8:00 a.m.–5:00 p.m. Check out what's going on at each of CDC's national centers and OD Staff Offices when you stop by their respective information tables.



# 2007 EIS Conference Program

## 2007 EIS Conference Program Schedule

Monday, April 16, 2007

**7:30 Registration Desk Opens**

**8:15 Welcome and Call to Order .....Grand Ballroom**  
**Stephen B. Thacker, Director**  
**Office of Workforce and Career Development**

**8:30 Session A: Tackling Public Health — Pathways, Policies, and Practice**  
**Opening Session.....Grand Ballroom**  
**Moderators: Julie L. Gerberding and Stephen B. Thacker**

- 8:35 TB or Not TB? That is the Question. . . .An Apparent Outbreak of Tuberculosis Among Mississippi Firefighters, 2006. *John Gibbins*
- 8:55 Investigation of a Nephrogenic Fibrosing Dermopathy Cluster Among Patients with Renal Failure — St. Louis, 2006. *Alexander Kallen*
- 9:15 Trends in Intussusception Hospitalization Among U.S. Infants, 1993–2004: Implications for Monitoring the Safety of the New Rotavirus Vaccine Program — United States. *Jacqueline Tate*
- 9:35 Multistate Outbreak of *Escherichia coli* O157:H7 from Lettuce Consumed at a National Fast Food Chain — Northeastern United States, November–December 2006. *Samir Sodha*
- 9:55 Cardiovascular Disease and Depression, Behavioral Risk Factor Surveillance System — Utah, 2005. *Juliana Grant*

**10:15 BREAK**

**10:45 Session B: What's There To Lose? — Obesity.....Grand Ballroom**  
**Moderator: Kathleen Toomey**

- 10:50 Lack of Association Between Breastfeeding and Preschool Age Overweight and At-Risk-for-Overweight Among Offspring of Gestational Diabetic Mothers — Michigan Birth Cohort, 1995–1999. *Mark Gershman*
- 11:10 Unhealthy Dieting Practices: Which Teens Are at Highest Risk? — Oregon 2005. *Clinton Haley*
- 11:30 Trying to Lose or Maintain Weight During Pregnancy — United States, 2003. *Connie Bish*
- 11:50 Periconceptional Use of Weight-Loss Products Including Ephedra and the Association with Birth Defects — The National Birth Defects Prevention Study, 1997–2003. *Rebecca Bitsko*

**12:15 LUNCH**

**12:30 Poster Session — Meet the authors in the Grand Ballroom. All posters presented during the conference will be on display Monday, 9:00 a.m. through Friday, 12:00 p.m. The following authors will be present to discuss their studies on Monday, 12:30–1:30 p.m.**

**Poster Session: “Refreshments Will Be Served” — Foodborne Illness**

- P1. Too Many Months Without an R: An Outbreak of *Vibrio parahaemolyticus* Infections Among Consumers of Raw Oysters — Washington, 2006. *Reena Gulati*
- P2. Outbreak of Mushroom Poisoning Caused by *Amanita bisporigera*, the Eastern American Destroying Angel — Minnesota, 2006. *Stacy Holzbauer*
- P3. Public Attitudes Toward Sugar-Sweetened Beverage Availability in Public Schools — HealthStyles Survey, 2004. *Celeste Philip*
- P4. Multistate Outbreak of *Salmonella* Braenderup Infections Associated with Tomatoes — United States, 2005. *Ann Schmitz*
- P5. Outbreak of *Escherichia coli* O157 Associated with Packaged Spinach — Wisconsin, 2006. *Arthur Wendel*

**Poster Session: Unhealthy Care — Health Care**

- P6. Outbreak of *Acinetobacter*-Related Infections Among Patients in Two Hospitals — Kentucky, 2006. *Suzanne Beavers*
- P7. Investigation of *Mycobacterium chelonae/abscessus* Cultures from Three Health-Care Facilities — Pennsylvania, 2002–2006. *Tai-Ho Chen*
- P8. Outbreak of *Enterococcus gallinarum* Infections After Total Knee Arthroplasties — Ohio, 2006. *Michael Cooper*
- P9. Outbreak of *Pseudomonas aeruginosa* Infections Following Cardiovascular Surgery — Indiana, 2006. *Katherine Ellingson*

**Poster Session: All Along the Watchtower — Surveillance**

- P10. Rates of Stool Culture and Antimicrobial Use for Diarrhea — Tennessee, 1995–2004. *L. Rand Carpenter*
- P11. The Impact of Workplace Surveillance on an Enhanced Preventive Program To Reduce Beryllium Sensitization — Tucson, Arizona, 2000–2004. *Kristin Cummings*
- P12. Compliance with Recommendations for Japanese Encephalitis Vaccination Among U.S. Travelers to Asia. *Mark Duffy*
- P13. Evaluation of Laboratory Surveillance for Lyme Disease — New Jersey, 2001–2006. *Adam Langer*
- P14. Cancer Incidence Among Children and Adolescents in the United States, 2001–2003. *Jun Li*
- P15. Homicide Surveillance: Consistency and Comprehensiveness of Multiple-Source Documentation — United States, 2003–2004. *Joseph Logan*
- P16. Hearing Difficulty Attributable to Work in Occupation and Industry: Analysis of National Health Interview Survey — United States, 1997–2003. *SangWoo Tak*
- P17. Usefulness of Passive Surveillance for Vaccine-Preventable Invasive Pneumococcal Disease in Oklahoma. *Melissa Van Dyke*

**1:30 Session C: Mass Consumption — Tuberculosis.....Grand Ballroom**

**Moderator: Philip LoBue**

- 1:35 Investigation of *Mycobacterium tuberculosis* Transmission Among Sailors Aboard USS Ronald Reagan — California, 2006. *Ann Buff*
- 1:55 Sub-Therapeutic Serum Concentrations of Anti-Tuberculosis Medications and Treatment Outcome — Botswana, 1997–1999. *Sekai Chideya*
- 2:15 An Investigation of Workplace Contacts of a Highly Contagious Tuberculosis Case-Patient — Maryland, Washington, DC, and Virginia, 2006. *Gita Mirchandani*
- 2:35 Mobility and Lack of Observed Therapy as Risk Factors for Unsuccessful Tuberculosis Treatment Outcome Among Non-Thais in Thailand, 2004–2005. *Bryan Kapella*

**3:00 BREAK**

**3:15 Session D: Your Mother Was Wrong — Do Not Eat Your Veggies  
Foodborne Disease.....Grand Ballroom**

**Moderator: Donald Sharp**

- 3:20 Outbreak of *Escherichia coli* O157:H7 Infections Associated with Lettuce at a Fast-Food Chain Restaurant — Minnesota, 2006. *Stacy Holzbauer*
- 3:40 Recurrent Outbreak of *Salmonella* Newport Infections Associated with Tomatoes — Eastern and Central United States, July–October 2006. *Christine Olson*
- 4:00 Deaths Due to Bacterial Pathogens Commonly Transmitted Through Food in the Foodborne Diseases Active Surveillance Network (FoodNet), 1996–2005. *Casey Barton Behraves*
- 4:20 Outbreak of *Salmonella* serotype Thompson Associated with Boiled Peanuts — South Carolina, 2006. *Kira Christian*
- 4:40 Campylobacteriosis Outbreak Associated with Pasteurized Milk — California, May 2006. *Jean Yuan*
- 5:00 Passenger Knowledge, Attitudes, and Practices During Cruise Ship Outbreaks Caused by Norovirus. *Antonio Neri*

**5:30 Cash-Bar Social.....Crown Room**

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**Tuesday, April 17, 2007**

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**8:30 Concurrent Session E1: Transmission, Testing, and Treatment — HIV.....Grand Ballroom  
Moderator: Linda Valleroy**

- 8:35 Renal Function Improves Among HIV-Infected People on Highly Active Antiretroviral Therapy — Uganda, 2003–2006. *Philip Peters*
- 8:55 Population Prevalence of Diagnosed and Undiagnosed HIV and Associated High-Risk Behaviors Among New York City Adults — New York City, 2004. *Trang Nguyen*
- 9:15 Rapid HIV Testing in Outreach and Community Settings. *Eric Tai*
- 9:35 HIV Seroprevalence Among Street Youth — St. Petersburg, Russia, 2006. *Lauren Zapata*
- 9:55 Using Antenatal Clinic HIV Surveillance To Evaluate Kenya’s Prevention of Mother-to-Child HIV Transmission Programs, 2005. *Abhijeet Anand*

**8:30 Concurrent Session E2: Another Inconvenient Truth — Heat, Hurricanes, and Health Disparities; Environmental.....Habersham Room  
Moderator: Tom Sinks**

- 8:35 Cholera, Crabs, and Katrina: Is Cholera Increasing in Southern Louisiana? *Joan Brunkard*
- 8:55 Racial and Ethnic Disparities in Asthma Treatment — National Asthma Survey, 2003. *Deidre Crocker*
- 9:15 Health Effects of Exposure to Water-Damaged Homes Six Months After Hurricane Katrina — New Orleans, Louisiana, March 2006. *Kristin Cummings*
- 9:35 Heat-Related Deaths Associated with a Severe Heat Wave — California, July 2006. *Thomas Kim*
- 9:55 Invasive Mold Infections and Mold Exposures Among Immunocompromised Adults After Hurricane Katrina — New Orleans, 2005–2006. *Carol Rao*

**10:15 BREAK**

- 10:45 Concurrent Session F1: Out of Control — Vaccine-Preventable Disease.....Grand Ballroom**  
**Presentation of the Iain C. Hardy Award**  
**Moderator: Jane Seward**
- 10:50 Multi-State Mumps Outbreak — United States, 2006. *Amy Parker*
  - 11:10 Measles Outbreak — Massachusetts, May–June 2006. *Sandra Schumacher*
  - 11:30 Mumps Outbreak Among a Highly Vaccinated Population: A Case-Control Study at the University of Kansas. *Angela Huang*
  - 11:50 When is Pertussis Not Pertussis? Outbreak of Pertussis-Like Illness — New Hampshire, 2006. *Manisha Patel*
- 10:45 Concurrent Session F2: I Spy — Public Health Surveillance.....Habersham Room**  
**Moderator: Denise Koo**
- 10:50 Evaluation of the Usefulness of Sentinel Provider Influenza-Like Illness Surveillance Alaska, 2002–2006. *Ryan Fagan*
  - 11:10 Completeness of Nebraska’s 2004 Hospital Discharge Data — How Much Is Missing? *Bryan Buss*
  - 11:30 Impact of Enhanced Surveillance for Human Arboviral Diseases — New Hampshire, 2006. *David Blaney*
  - 11:50 Repeat Gonorrhea Infections — San Diego County, 2001–2006. *Swati Deshpande*
- 12:15 LUNCH**
- 12:30 Special Session: Extensively Drug-Resistant Tuberculosis — The Perfect Storm.....Habersham Room**  
**Moderator: Kenneth G. Castro**  
**Speakers: Peter Cegielski, Heather Menzies, Charles Wells, and Kenneth G. Castro**
- 12:30 Poster Session. Posters on display in the Grand Ballroom. All posters presented during the conference will be on display Monday, 9:00 a.m. through Friday, 12:00 p.m.**
- 1:45 Session G: Women and Children First — Reproductive/Women’s Health.....Grand Ballroom**  
**Moderators: William Callaghan and William Sappenfield**
- 1:50 Are Women Who Experience Coercive First Intercourse More Likely to Have an Unintended First Birth? *Corrine Williams*
  - 2:10 Racial Disparities in Neonatal Early Onset Group B Streptococcal Disease in the Era of Universal Screening: United States, 2003–2005. *Roopal Patel*
  - 2:30 Underregistration of Extremely Low Birthweight Infant Deaths — Ohio, 2006. *Michael Cooper*
  - 2:50 Should We Be Concerned About Late-Preterm Birth and Risk for Developmental Disabilities? *Carrie Lazarus*
  - 3:10 Trends in Late-Onset Neonatal Group B Streptococcal Disease — United States, 1990–2005. *Hannah Jordan*
  - 3:30 Cervical Cancer Epidemiology in Connecticut, 1994–2003 — Implications for Vaccination Programs. *Lynn Sosa*
- 4:00 BREAK**
- 6:00 Prediction Run, 14<sup>th</sup> Street Entrance..... Piedmont Park**

**8:30 Concurrent Session H1: Going Beyond the Two-by-Two — Peavy Finalists.....Grand Ballroom**

**Moderator: Owen Devine**

- 8:35 Effect of Maternal Smoking Status on Breastfeeding Practice — Missouri Pregnancy Related Assessment and Monitoring System Survey, 2005. *Thomas Weiser*
- 8:55 Substantial Underreporting of Carbon Monoxide Poisonings — Alabama, 2005. *Teresa Morrison*
- 9:15 Psychosocial Correlates of Current Smoking Among Adolescent Male Students —Thailand, 2005. *Lela McKnight-Eily*
- 9:35 Lower Early Mortality Rates Among Patients on Antiretroviral Treatment at Clinics Offering Cotrimoxazole Prophylaxis in Malawi. *David Lowrance*
- 9:55 Using Population-Based HIV Surveys To Estimate HIV Incidence in Kenya (2003), Malawi (2005), and Uganda (2005). *Abhijeet Anand*

**8:30 Concurrent Session H2: Growing Up Is Hard To Do — Kids and Teens.....Habersham Room**

**Moderator: Susan Lukacs**

- 8:35 Second Hand Tobacco Smoke — Is There a Difference in Exposure by Race-Ethnicity? United States, 1999–2004. *Cinzia Marano*
- 8:55 Outbreak of *Escherichia coli* O157:H7 at a Day Camp — Bergen County, New Jersey, 2006. *Adam Langer*
- 9:15 Community Response to School Closure Resulting from an Influenza B Outbreak — Yancey County, North Carolina, November 2006. *April Johnson*
- 9:35 Elemental Mercury Exposure in a Child Care Center — New Jersey, 2006. *Mary Glenshaw*
- 9:55 Media Exposure Among Children with Developmental Disabilities — United States, 2003. *Alexandra Balaji*

**10:15 BREAK**

**10:30 Concurrent Session I1: Fragile, Handle with Care — Injury.....Grand Ballroom**

**Moderator: Ileana Arias**

- 10:35 Use of Coroner Data for Surveillance of Drug-Overdose Deaths — Los Angeles County, California, 1999–2003. *Derek Ehrhardt*
- 10:55 Gender Specific Mental Health and Behavioral Outcomes Among Physically and Sexually Maltreated High-Risk Youths — Northeastern Region of the United States, 2004. *Joseph Logan*
- 11:15 Clinical Syndrome Associated with Diethylene Glycol-Contaminated Cough Syrup — Panama, 2006. *Fernanda Lessa*
- 11:35 Elevated Fall-Related Mortality Rates — New Mexico, 1999–2004. *Aaron Wendelboe*

**10:30 Concurrent Session I2: The ABC's of Hepatitis .....Habersham Room**

**Moderator: John Ward**

- 10:35 Investigation of Perinatal Hepatitis B Virus (HBV) Infections Among Marshall Islanders Living in Washington County, Arkansas — 2003–2005. *Gayle Fischer*
- 10:55 Outbreak of Hepatitis A Associated with Contaminated Spring Water — North Carolina, 2006. *Zackary Moore*
- 11:15 Hepatitis C Virus Infection Among American Indian Women Seeking Prenatal Care — Northern Plains, 2005–2006. *Christine Dubray*
- 11:35 Infection-Control Practices in Assisted Living Facilities: A Response to Hepatitis B Outbreaks Associated with Blood Glucose Monitoring — Virginia, 2006. *Ami Patel*

**12:00 LUNCH**

**12:30 Poster Session — Meet the authors in the Grand Ballroom. All posters presented during the conference will be on display Monday, 9:00 a.m. through Friday, 12:00 p.m. The following authors will be present to discuss their studies on Wednesday, 12:30–1:30 p.m.**

**Poster Session: We Still Fly Coach — International**

- P18. Community Household Survey To Describe Healthcare Utilization Practices and Risk Factors for Diarrheal Diseases in the Department of Santa Rosa, Guatemala — 2006. *Wences Arvelo*
- P19. Sandal-Leather Epidemiology: A Prolonged Outbreak of Typhoid Fever — Majuro, Republic of the Marshall Islands, November 2005–July 2006. *Sharon Greene*
- P20. Oral Health Status and Treatment Needs Among Refugees — Kigoma Region, Tanzania, 2006. *Freder Jaramillo*
- P21. Prevalence of Dengue Virus Nucleic Acid in Blood Products Donated in Puerto Rico. *Hamish Mohammed*
- P22. Performance of Rapid Diagnostic Tests for Chagas Disease — Arequipa, Peru, 2006. *Jennifer Verani*
- P23. Management of Children with Severe Febrile Illness at Peripheral Health Facilities United Republic of Tanzania, 2006. *Nicholas Walter*

**Poster Session: Hot and Bothered**

- P24. Risk Factors for Gonorrhea Among Heterosexuals — San Francisco, 2006. *Pennan Barry*
- P25. Cryptosporidiosis Outbreak and Follow-Up Study — Douglas County, Colorado, 2006. *Tegan Boehmer*
- P26. Man's Best Friend? Dog-Associated Risk Factors for Human Plague — New Mexico and Colorado, 2006. *L. Hannah Gould*
- P27. Heat-Related Deaths — New York City, July–August, 2006. *Bruce Gutelius*
- P28. Outbreak of Methicillin-Resistant *Staphylococcus aureus* Infections Among a Football Team — West Virginia, 2006. *Aron Hall*
- P29. Too Hot To Handle? Heat-Related Illness Mortality During a Heat Wave and Power Outage — Missouri, 2006. *Thomas Weiser*
- P30. Outbreak of Coccidioidomycosis in a State Prison — California, 2005. *Jean Yuan*

**1:30 Session J: You Came To Get Better — Health Care.....Grand Ballroom  
Moderator: Clifford McDonald**

- 1:35 Cluster of *Burkholderia cepacia*-Complex Among Non-Cystic Fibrosis Patients in a Pediatric Hospital — Chicago, 2006. *Cynthia Lucero*
- 1:55 Emergence of Vancomycin-Resistant Enterococci in One Regional Health-Care Facility — North Dakota, 2006. *Dwayne Jarman*
- 2:15 A Pseudo-Outbreak of *Mycobacterium abscessus* at a Healthcare Facility — Florida, 2006. *David Blossom*
- 2:35 *Listeria monocytogenes* in Donated Platelets — United States, 2005. *Manoj Menon*
- 2:55 Risk of Infection Due to Improperly Cleaned Instrument for Prostate Cancer Biopsies — Maine, 2006. *Fernanda Lessa*
- 3:15 Epidemiologic Investigation of *Trypanosoma cruzi* Infection in Two Heart-Transplant Recipients — Los Angeles, California, 2006: Policy and Testing Implications. *Heather Kun*

**3:45 BREAK**

**4:00 Session K: Alexander D. Langmuir Memorial Lecture and Reception.....Grand Ballroom  
Announcement of Langmuir Prize Winner  
Presentation of Distinguished Friends of EIS Award  
Sponsored by the EIS Alumni Association and the Office of Workforce and Career Development**

**Speaker:** Thomas R. Frieden, MD, MPH  
Commissioner, New York City Department of Health and Mental Hygiene

**Topic:** Implications of Tuberculosis Control on Evidence-Based Public Health Practice

**5:30 EIS Alumni Association Meeting.....Crown Room**

**7:30 Session L: Field Epidemiology — Translating Science into Practice Around the World;  
International Night.....Habersham Room**  
**Moderators: Murray Trostle and Roberto Flores**

This session is cosponsored by the Division of Epidemiology and Surveillance Capacity Development (DESCD) in Coordinating Office for Global Health (COGH) at CDC and the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET).

- 7:35 Epidemic Chikungunya Fever, India and Indian Ocean, 2006: Laboratory-Based Surveillance for Imported Cases, United States. *Eileen Farnon*
- 7:55 Large Outbreak of Measles in North Rhine-Westphalia, Germany, 2006. *Ole Wichmann*
- 8:15 An Outbreak Investigation of Leptospirosis — Fayezebad District, Tajikistan, April 14–22, 2006. *Matluba K. Dehkanova*
- 8:35 Outbreak of Methanol Poisoning in Leon, Nicaragua, September 2006. *Samy Pérez*
- 8:55 Laboratory Investigation of an Outbreak of Cholera in Accra Metropolis, Accra, Ghana — May 2006. *Dramani E. Kwesi*
- 9:15 *Mycobacterium abscessus* Post-Injection Abscesses from Extrinsic Contamination of Multi-Dose Bottles of Normal Saline — Guangdong, China, December 2006. *Jun Yuan*
- 9:35 Late-Breaking Report — TBD

**International Night Poster Session**

- P1. Hepatitis E Outbreak Investigation, Wau County, Western Bahr El Ghazal State, Southern Sudan, 2006. *Lucia W. Kur*
- P2. An Outbreak of Norovirus Gastroenteritis Attributed to Contact, an Unsafe Water Supply, and Flies in a Remote Village — Guangdong Province, China, 2006. *Wenti Xu*
- P3. An Epidemic of Paratyphoid Fever Attributed to Inadequately Cooked Bivalve Mollusks, Fujian Province, China, 2006. *Bo Yi*
- P4. Rotavirus Transmission Through a Hospital Outpatient Department, China — October–November 2006. *Yuan Li*
- P5. A Cholera Outbreak Response After a Major Disaster — Albay, Philippines, 2006. *Joselito R. Feliciano*
- P6. *Salmonella* Kottbus Outbreak in Infant Caused by Bottled Water in Gran Canaria Island (Spain). *Rocío Palmera*
- P7. A Case-Control Study To Identify Risk Factors for Typhoid in Darjeeling, West Bengal, India, 2005–2006: Evidence for Practical Action. *Puran K. Sharma*
- P8. Surveillance in the Public Sector Captures Only a Small Fraction of Measles Cases in Howrah District, West Bengal, India, 2005. *Debasis Roy*
- P9. A Fulminating Food Poisoning Caused by *Bacillus cereus* in Village Kuhabaus of Bolangir District, Orissa, India, 2006. *Manjubala Panda*
- P10. Persistence of Diphtheria in Hyderabad, the Capital of Andhra Pradesh State, India: Importance of Booster Doses. *Sailaja Bitragunta*

**9:45 Presentation of William H. Foege Award.....Habersham Room**  
**Closing Remarks**  
**Reception**

**8:30 Session M: Holy Mackel!.....Grand Ballroom  
Mackel Award Finalists**

**Moderators: Tanja Popovic and Tom Shinnick**

- 8:35 Community-Associated Methicillin-Resistant *Staphylococcus aureus* Among Personnel at a Pediatric Clinic — Tennessee, 2006. *L. Rand Carpenter*
- 8:55 Multistate Outbreak of *Fusarium* Keratitis Associated with Use of a Contact Lens Solution — United States, 2005–2006. *Douglas Chang*
- 9:15 Human *Mycobacterium bovis* Tuberculosis — United States, 1995–2005. *Michele Hlavsa*
- 9:35 Outbreak of Acute Renal Failure Syndrome Due to Diethylene Glycol Poisoning — Panama, 2006. *E. Danielle Rentz*
- 9:55 Epidemiologic and Molecular Investigation of an Outbreak of Hepatitis C Virus Infection at a Hemodialysis Unit — Richmond, Virginia, 2006. *Nicola Thompson*

**10:15 BREAK**

**10:30 Session N: Risky Business — Occupational..... Grand Ballroom  
Moderator: Boris Lushniak**

- 10:35 Unintended Exposures to *Brucella* Species in Four Microbiology Laboratories — Colorado, 2006. *Wendy Bamberg*
- 10:55 Elevated Prevalence of Sarcoidosis and Respiratory Illness Among Workers in an Office Building — Vermont, 2006. *A. Scott Laney*
- 11:15 Risk of Occupational Transmission of Avian Influenza A (H5N1) Virus, Northern Nigeria, March 2006. *Justin Ortiz*
- 11:35 Sudden Cardiac Death Among On-Duty Firefighters — United States, 1998–2004. *Marilyn Ridenour*

**12:00 LUNCH**

**12:30 Special Session: Preconception Care — Missed Opportunities To Further Improve  
Perinatal Outcomes.....Habersham Room**

**Moderator: Kathleen Toomey**

**Speakers: R. Louise Floyd, Ridgely Fisk Green, and Lauren Zapata**

**1:30 Session O: Think Globally, Act Globally — International.....Grand Ballroom  
Presentation of the Paul C. Schnitker International Health Award**

**Moderator: Rob Quick**

- 1:35 Access to Healthcare for Pneumonia in Santa Rosa, Guatemala. *Hannah Jordan*
- 1:55 Prevalence of Lymphatic Filariasis in American Samoa After Three Years of Improved Social Mobilization and Mass Drug Administration. *Jennifer Liang*
- 2:15 Ownership and Usage of Insecticide-Treated Nets in Niger After an Integrated Campaign — September 2006. *Julie Thwing*
- 2:35 Clinical Features that Distinguish Dengue Fever from Other Dengue-Like Illnesses Among Children at Initial Presentation. *Mary Ramos*
- 2:55 Orthopoxvirus Seroprevalence in Residents of Likuuala District, Republic of Congo: A Surrogate Measure for Monkeypox Virus Exposure. *Edith Lederman*

**3:15 BREAK**

**3:30 Session P: The Long Haul — Chronic.....Grand Ballroom  
Moderator: Janet Collins**

- 3:35 Prevalence and Correlates of Sunburn Among U.S. Adults, by Race/Ethnicity — Behavioral Risk Factor Surveillance System 1999, 2003, and 2004. *Djenaba Joseph*
- 3:55 Improvement in Lipid and Glucose Control Among Blacks with Diabetes — Raleigh and Greensboro, North Carolina, 1997–2004. *Stephanie Rutledge*

- 4:15 Disparities in Dysphagia Screening Among Acute Stroke Patients — Paul Coverdell National Acute Stroke Registry, 2005–2006. *Amy Valderrama*
- 4:35 Depression and Chronic Diseases: A Debilitating Combination — Oregon, 2005. *Clinton Haley*

**8:30 EIS Satirical Revue.....Grand Ballroom**  
**Presentation of Philip S. Brachman Award**

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**Friday, April 20, 2007**

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**8:30 Session Q: Don't Procrastinate — Vaccinate; Immunizations.....Grand Ballroom**  
**Moderator: Anne Schuchat**

- 8:35 Use of Recruitment Incentives To Increase Uptake of Meningococcal Vaccine During a Community Vaccination Campaign — New York City, 2006. *Trang Nguyen*
- 8:35 History of Genital Warts Among 18–59 Year Olds in the U.S., National Health and Nutrition Examination Surveys (NHANES), 1999–2004. *Thu-Ha Dinh*
- 9:15 Safety Surveillance of Quadrivalent Meningococcal Conjugate Vaccine (MCV4, Menactra®). *Fatma Soud*
- 9:35 Carriage Survey During an Outbreak of Meningococcal Serogroup C Disease Among Drug Users and Their Contacts — Brooklyn, New York, 2005–2006. *Eric Stern*

**10:00 BREAK**

**10:15 Presentation of Awards.....Grand Ballroom**

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

**10:30 Session R: Late-Breaking Reports.....Grand Ballroom**  
**10:30 a.m.-11:45 a.m.**

**Moderators: Doug Hamilton and Kashef Ijaz**

**12:00 LUNCH**

**12:30 Special Session: Too Hot To Handle: Climate Change and Public Health.....Habersham Room**  
**Moderator: Mike McGeehin**

**1:30 Session S: Out of the Closet — Clostridia.....Grand Ballroom**  
**Moderator: Roberta Carey**

- 1:35 An Epidemic Hospital Strain as a Cause of Community-Associated *Clostridium difficile*-Associated Disease: FoodNet Pilot Study, 2006. *Umid Sharapov*
- 1:55 Botulism Associated with Commercial Carrot Juice — Georgia, 2006. *Petra Wiersma*
- 2:15 Toxic Shock Associated with *Clostridium sordellii* and *Clostridium perfringens* Following Induced and Spontaneous Abortion. *Adam Cohen*
- 2:35 Outbreak of *Clostridium perfringens* at Food and Drug Administration Food and Safety Conference — New Orleans, Louisiana, 2006. *Joan Brunkard*
- 2:55 Emerging *Clostridium difficile*-Associated Disease in the Community and the Role of Non-Antimicrobial Risk Factors. *Preeta Kutty*

**3:15 Closing Remarks and Adjournment..... Grand Ballroom**  
**Stephen B. Thacker, Director**  
**Office of Workforce and Career Development**

## Key for Presenting EIS Officers

|            |   |
|------------|---|
| NCBDDD     | National Center on Birth Defects and Developmental Disabilities                           |
| NCCDPHP    | National Center for Chronic Disease Prevention and Health Promotion                       |
| NCEH/ATSDR | National Center for Environmental Health/Agency for Toxic Substances and Disease Registry |
| NCHS       | National Center for Health Statistics   |
| NCHHSTP    | National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention                     |
| NCIPC      | National Center for Injury Prevention and Control   |
| NCIRD      | National Center for Immunization and Respiratory Diseases                                 |
| NCPDCID    | National Center for Preparedness, Detection, and Control of Infectious Diseases           |
| NCZVED     | National Center for Zoonotic, Vector-Borne, and Enteric Diseases                          |
| NIOSH      | National Institute for Occupational Safety and Health                                     |
| OWCD       | Office of Director/Office of Workforce and Career Development                             |

# Presenting EIS Officers

## EIS Officers by National Center or OD Office

### **NCBDDD**

Alexandra Balaji  
Rebecca Bitsko  
Carrie Lazarus

### **NCCDPHP**

Connie Bish  
Freder Jaramillo  
Djenaba Joseph  
Jun Li  
Lela McKnight-Eily  
Celeste Philip  
Stephanie Rutledge  
Amy Valderrama  
Lauren Zapata

### **NCEH/ATSDR**

Deidre Crocker  
Teresa Morrison  
Antonio Neri  
E. Danielle Rentz

### **NCHS**

Cinzia Marano  
Corrine Williams

### **NCHHSTP**

Abhijeet Anand  
Ann Buff  
Sekai Chideya  
Thu-Ha Dinh  
Gayle Fischer  
Michele Hlavsa

David Lowrance  
Philip Peters  
Eric Tai  
Nicola Thompson

### **NCIPC**

Joseph Logan

### **NCIRD**

April Johnson  
Hannah Jordan  
Justin Ortiz  
Amy Parker  
Manisha Patel  
Roopal Patel  
Fatma Soud  
Eric Stern  
Jacqueline Tate  
Melissa Van Dyke  
Nicholas Walter

### **NCPDCID**

David Blossom  
Adam Cohen  
Katherine Ellingson  
Alexander Kallen  
Bryan Kapella  
Preeti Kutty  
Fernanda Lessa  
Cynthia Lucero

### **NCZVED**

Wences Arvelo

Casey Barton Behravesh  
Douglas Chang  
Mark Duffy  
Eileen Farnon  
L. Hannah Gould  
Sharon Greene  
Edith Lederman  
Jennifer Liang  
Manoj Menon  
Hamish Mohammed  
Christine Olson  
Mary Ramos  
Carol Rao  
Ann Schmitz  
Umid Sharapov  
Samir Sodha  
Julie Thwing  
Jennifer Verani

### **NIOSH**

Kristin Cummings  
John Gibbins  
Marilyn Ridenour  
SangWoo Tak

### **OWCD**

Wendy Bamberg  
Pennan Barry  
Suzanne Beavers  
David Blaney  
Tegan Boehmer  
Joan Brunkard  
Bryan Buss

L. Rand Carpenter  
Tai-Ho Chen  
Kira Christian  
Michael Cooper  
Swati Deshpande  
Christine Dubray  
Derek Ehrhardt  
Ryan Fagan  
Mark Gershman  
Mary Glenshaw  
Juliana Grant  
Reena Gulati  
Bruce Gutelius  
Clinton Haley  
Aron Hall  
Stacy Holzbauer  
Angela Huang  
Dwayne Jarman  
Thomas Kim  
Heather Kun  
A. Scott Laney  
Adam Langer  
Gita Mirchandani  
Zackary Moore  
Trang Nguyen  
Ami Patel  
Sandra Schumacher  
Lynn Sosa  
Thomas Weiser  
Arthur Wendel  
Aaron Wendelboe  
Petra Wiersma  
Jean Yuan



# Incoming EIS Class of 2007

|                                    |                                |                                 |
|------------------------------------|--------------------------------|---------------------------------|
| Aburto, Nancy, PhD, MS             | Guh, Alice, MD, MPH            | Oster, Alexandra, MD            |
| Adjemian, Jennifer, PhD            | Halpin, John, MD, MPH          | Palekar, Rakhee, MD, MPH        |
| Aghoghovbia, Titilayo, MBBS, MSc   | Hanson, Matthew, MD            | Park, Sohyun, PhD, MS           |
| Ahmed, Firas, MD, MPH              | Harris, Julie, PhD, MPH        | Piercefield, Emily, MD, DVM, MS |
| An, Ning, MD, PhD, MPH             | Howard, Christopher, MD        | Polakowski, Laura, MD, MSPH     |
| Anderson, Stacey, DVM, MPH         | Huang, Wan-Ting, MD            | Reed, Carrie, DSc, MPH          |
| Andrew, Bridgett, RPA-c, MPH       | Hwang, Jimée, MD, MPH          | Robbins, Cheryl, PhD, MS        |
| Auld, Andrew, MBChB                | Iossifova, Yulia, MD, PhD      | Rosen, Jennifer, MD             |
| Basavaraju, Sridhar, MD            | Iqbal, Shahed, MBBS, PhD, MPH  | Russo, Elizabeth, MD            |
| Bloss, Emily, PhD, MPH, MA         | Jaeger, Jenifer, MD            | Schaefer, Melissa, MD           |
| Boore, Amy, PhD, MPH               | Karon, Amy, DVM, MPH           | Schillie, Sarah, MD, MPH, MBA   |
| Brennan, Renee, PhD, MS            | Katz, Kenneth, MD, MSc, MSCE   | Sever, Adrianne, MD             |
| Byrd, Kathy, MD, PhD, MPH          | Katz, Naomi, MD, MPH           | Shah, Neha, MD, MPH             |
| Cantey, Paul, MD, MPH              | Kurkjian, Katie, DVM, MPH      | Sircar, Kanta, PhD, MPH         |
| Chavez, Pollyanna, PhD, MS         | Llata, Eloisa, MD, MPH         | Song, Rinn, MD                  |
| Chen, Sanny, PhD, MHS              | MacFarquher, Jennifer, RN, MPH | Sugerman, David, MD, MPH        |
| Davis, Shane, PhD, MA              | MacNeil, Adam, PhD, MPH        | Toblin, Robin, PhD, MA          |
| Dee, Deborah, PhD, MPH             | Mattson, Christine, PhD, MS    | Tongren, J. Eric, PhD, MSPH     |
| DePasquale, John, MD, MPH          | McIntyre, Anne, PhD, MPH       | Trivedi, Kavita, MD             |
| Desai, Mitesh, MD, MPH             | Melstrom, Paul, PhD            | Viray, Melissa, MD              |
| Deutscher, Meredith, MD            | Menendez, Cammie, PhD, MPH, MS | Weber, Ingrid, MBChB            |
| Dharan, Nila, MD                   | Mody, Rajal, MD, MPH           | Wei, Stanley, MD                |
| Dorell, Christina, MD, MPH         | Moore, Latetia, PhD, MSPH      | Wu, Henry, MD                   |
| Dowell, Deborah, MD                | Morgan, Oliver, PhD, MSc       | Yates, Johnnie, MD              |
| Finks, Jennie, DVM, MVPH           | Murphy, Matthew, PhD, MS       | Yu, Ying-Ying, PhD, MA, MS      |
| Forhan, Sara, MD, MPH              | Nair, Hemanth, PhD, MPH        |                                 |
| Galle, Mef, MD, MPH                | Nett, Randall, MD, MPH         |                                 |
| Grigsby-Toussaint, Diana, PhD, MPH | Nguyen, Michael, MD            |                                 |



# Overview of Awards and Prize Manuscripts

## Alexander D. Langmuir Prize Manuscript Award

The ADL Prize was established in 1966 by the EIS Alumni Association to encourage EIS officers to publish papers based on epidemiologic work performed while in EIS. The award is given to a manuscript or publication written by a current EIS officer or “first-year alumni,” for a well-designed and executed, clearly and persuasively written report of an epidemiologic study.

## Philip S. Brachman Award

This award recognizes excellence in teaching epidemiology to EIS officers. The Brachman Award is sponsored by the graduating class of EIS officers.

## Distinguished Friend of the EIS Award

Awarded by the EIS Alumni Association, the Distinguished Friend of EIS Award recognizes a person for his or her valued contributions that have made an important difference to the health, welfare and happiness of EIS officers and the EIS Program.

## Iain C. Hardy Award

The Iain C. Hardy Award recognizes a current EIS officer or an alumni within 5 years of having completed EIS training who has made an outstanding contribution to the control of vaccine-preventable diseases.

## Donald C. Mackel Memorial Award

This award is sponsored by the EIS Alumni Association and recognizes a current EIS officer for the oral or poster presentation that best exemplifies the effective application of a combined epidemiologic and laboratory approach to an investigation.

## J. Virgil Peavy Memorial Award

Sponsored by the EIS Alumni Association, this notable award recognizes a current EIS officer for the oral or poster presentation that best exemplifies the effective and innovative application of statistics and epidemiologic methods in an investigation or study.

## Outstanding Poster Presentation Award

This award recognizes the outstanding EIS conference poster of a current EIS officer. The poster is selected on the basis of (1) scientific content, including originality, study design and analysis; (2) public health impact; and (3) effectiveness of presentation.

## Paul C. Schnitker International Health Award

This award recognizes a current EIS officer or first-year EIS alumni who has made an unusual contribution to international public health. 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.

## James H. Steele Veterinary Public Health Award

This award is given to a current or former EIS Officer who has made outstanding contributions in the field of veterinary public health. This award recognizes outstanding contributions in the investigation, control, or prevention of zoonotic diseases or other animal-related human health problems.



# Award Committee Members

## **Alexander D. Langmuir Prize Manuscript Award**

Philip Brachman (EIS '54, Chair)  
Christine Branche (EIS '88)  
Ken Castro (EIS '83)  
Marion Kainer (EIS '00)  
Janet Mohle-Boetani (EIS '90)  
John V. Rullán (EIS '85)

## **Donald C. Mackel Memorial Award**

John T. Bernert  
Renee Funk (EIS '02, Co-Chair)  
Pat Lammie  
Eric Mintz (EIS '89, Co-Chair)

## **Outstanding Poster Presentation Award**

Lara Akinbami (EIS '98)  
Diana Bensyl (EIS '99, Chair)  
Renee Maciejewski  
Nancy Sahakian (EIS '02)

## **Paul C. Schnitker International Health Award**

Lisa Cairns (EIS '96, Chair)  
Doug Hamilton (EIS '91, Ex-Officio)  
Steve Jones (EIS '69, Ex-Officio)  
Michael Pratt (EIS '89)  
Frank Richards (EIS '82)  
Alexander Rowe (EIS '94)  
Myron Schultz (EIS '63)  
Charles Wells (EIS '95)

## **Iain C. Hardy Award**

Beth Bell (EIS '92, Chair)  
John Modlin (EIS '73)  
William Schaffner (EIS '66)  
Anne Schuchat (EIS '88)  
Melinda Wharton (EIS '86)

## **James H. Steele Veterinary Public Health Award**

Hugh Mainzer (EIS '92)  
Nina Marano  
Jennifer McQuiston (EIS '98)  
Stephanie Ostrowski (EIS '87)  
Peter Schantz (EIS '74, Chair)

## **J. Virgil Peavy Memorial Award**

Ileana Arias  
Mick Ballesteros (EIS '01)  
Owen Devine (Chair)  
Jeffrey J. Sacks (EIS '79)  
David J. Sencer (EIS '75)  
G. David Williamson



## Awards Presented at the EIS Conference, 2006

### **Alexander D. Langmuir Prize Manuscript Award**

Case-Control Study of an Acute  
Aflatoxicosis Outbreak, Kenya, 2004

*Eduardo Azziz-Baumgartner,  
Kimberly Lindblade, Karen Giesecker, Helen  
Schurz Rogers, Stephanie Kieszak, Henry  
Njapau, Rosemary Schleicher, Leslie F.  
McCoy, Ambrose Misore, Kevin DeCock,  
Carol Rubin, Laurence Slutsker, and the  
Aflatoxin Investigative Group*

### **Donald C. Mackel Memorial Award**

Delayed Onset of *Pseudomonas  
fluorescens* Group Bloodstream Infections  
After Exposure to Contaminated Heparin  
Flush — Michigan and South Dakota, 2005

*Mark Gershman and Judith Noble-Wang*

### **Outstanding Poster Presentation Award**

Risk Factors for *Helicobacter pylori* in a  
Rural Community — Montana, 2005

*Elizabeth Melius, S. Davis, J. Sobel, B.  
Gold, A. Henderson, J. Cheek*

### **Philip S. Brachman Award**

*Ralph Henderson*

### **Distinguished Friend of the EIS Award**

*Kashef Ijaz and Robert Tauxe*

### **Paul C. Schnitker International Health Award**

*Kevin Cain*

### **Iain C. Hardy Award**

*Gustavo Dayan*

### **James H. Steele Veterinary Public Health Award**

*Katherine Feldman*

*James Kile*

### **J. Virgil Peavy Memorial Award**

*Andrea Sharma*

# Alexander D. Langmuir

# Lectures, 1972–2006

- 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*

# Alexander D. Langmuir

Alexander D. Langmuir was born in Santa Monica, California. He received his AB in 1931 from Harvard, his MD in 1935 from Cornell University Medical College, and his MPH in 1940 from the Johns Hopkins

University School of Hygiene and Public Health. After serving as a public health officer in New York and as an epidemiologist with the U. S. Army from 1942 to 1946, Langmuir returned to Johns Hopkins to

become associate professor of epidemiology in the school of medicine. In 1949, he became director of the epidemiology branch of the National Communicable Disease Center in Atlanta, a position



he held for over 20 years. He wrote extensively on all phases of epidemiology on a global basis and was recognized internationally as a leading contributor in epidemiology. Langmuir was a visiting professor at the Johns Hopkins University School of Hygiene and Public Health from 1988 until his death in 1993.

- |             |   |             |  |
|-------------|---|-------------|--|
| <b>1996</b> | 50 Years of Epidemiology at CDC. <i>Jeffrey P. Koplan</i>   | <b>2002</b> | Public Health Response to Terrorism: Rising to the Challenge. <i>Marcelle Layton</i>                                       |
| <b>1997</b> | Public Health, Population-Based Medicine, and Managed Care. <i>Diana B. Petitti</i>   | <b>2003</b> | Alex Langmuir's Somewhat Quiet Legacy: Epidemiology, Sexual Health, and Personal Choices. <i>Willard (Ward) Cates, Jr.</i> |
| <b>1998</b> | Pandemic Influenza: Again? <i>Robert Couch</i>  | <b>2004</b> | HIV, Epidemiology, and the CDC. <i>James W. Curran</i>   |
| <b>1999</b> | The Evolution of Chemical Epidemiology. <i>Philip J. Landrigan</i>  | <b>2005</b> | Killin' Time: Alcohol and Injury. <i>Alexander C. Wagenaar</i>   |
| <b>2000</b> | Does <i>Chlamydia pneumoniae</i> Cause Atherosclerotic Cardiovascular Disease? Evaluating the Role of Infectious Agents in Chronic Diseases. <i>Walter E. Stamm</i> | <b>2006</b> | Measuring Malaria. <i>Brian Greenwood</i>  |
| <b>2001</b> | Halfway Through a Century of Excellence. <i>J. Donald Millar</i>  |             |  |

# Alexander D. Langmuir

# Prize Manuscripts, 1966-2006

- 1966** Complications of Smallpox Vaccination: I. National Survey in the United States, 1963. *N Engl J Med* 1967;276:125–32. *J.M. Neff, J.M. Lane, J.H. Pert, R. Moore, J.D. Millar, D.A. Henderson*
- 1967** An Outbreak of Neuromyasthenia in a Kentucky Factory — The Possible Role of a Brief Exposure to Organic Mercury. *Am J Epidemiol* 1967;86:756–64. *G. Miller, R. Chamberlin, W.M. McCormack*
- 1968** Salmonellosis from Chicken Prepared in Commercial Rotisseries: Report of an Outbreak. *Am J Epidemiol* 1969;90:429–37. *S.B. Werner, J. Allard, E.A. Ager*
- 1969** Outbreak of Tick-Borne Relapsing Fever in Spokane County, Washington. *JAMA* 1969;210:1045–50. *R.S. Thompson, W. Burgdorfer, R. Russell, B.J. Francis*
- 1970** Tularemia Epidemic: Vermont, 1968 Forty-Seven Cases Linked to Contact with Muskrats. *N Engl J Med* 1969;280:1253–60. *L.S. Young, D.S. Bicknell, B.G. Archer, et al.*
- 1971** Tomato Juice-Associated Gastroenteritis, Washington and Oregon, 1969. *Am J Epidemiol* 1972;96:219–26. *W.H. Barker Jr., V. Runte*
- 1972** *Salmonella* Septicemia from Platelet Transfusions: Study of an Outbreak Traced to a Hematogenous Carrier of *Salmonella cholerae-suis*. *Ann Intern Med* 1973;78:633–41. *F.S. Rhame, R.K. Root, J.D. MacLowry, T.A. Dadisman, J.V. Bennett*
- 1973** Outbreak of Typhoid Fever in Trinidad in 1971 Traced to a Commercial Ice Cream Product. *Am J Epidemiol* 1974;100:150–7. *A. Taylor Jr., A. Santiago, A. Gonzales-Cortes, E.J. Gangarosa*
- 1974** Oyster-Associated Hepatitis: Failure of Shellfish Certification Programs to Prevent Outbreaks. *JAMA* 1975;233:1065–8. *B.L. Portnoy, P.A. Mackowiak, C.T. Caraway, J.A. Walker, T.W. McKinley, C.A. Klein Jr.*
- 1975** Staphylococcal Food Poisoning Aboard a Commercial Aircraft. *Lancet* 1975;2:595–9. *M.S. Eisenberg, K. Gaarslev, W. Brown, M. Horwitz, D. Hill*
- 1976** Nursery Outbreak of Peritonitis with Pneumoperitoneum Probably Caused by Thermometer-Induced Rectal Perforation. *Am J Epidemiol* 1976;104:632–44. *M.A. Horwitz, J.V. Bennett*
- 1977** Epidemic *Yersinia enterocolitica* Infection Due to Contaminated Chocolate Milk. *N Engl J Med* 1978;298:76–9. *R.E. Black, R.J. Jackson, T. Tsai, et al.*
- 1978** Measles Vaccine Efficacy in Children Previously Vaccinated at 12 Months of Age. *Pediatrics* 1978;62:955–60. *J.S. Marks, T.J. Halpin, W.A. Orenstein*
- 1979** An Outbreak of Legionnaires' Disease Associated with a Contaminated Air-Conditioning Cooling Tower. *N Engl J Med* 1980;302:365–70. *T.J. Dondero, Jr., R.C. Rendtorff, G.F. Mallison, et al.* and Risk of Vascular Disease in Women: Smoking, Oral

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# Abstracts

## 2007 Conference Abstracts

Monday, April 16, 2007  
Session A: Tackling Public Health —  
Pathways, Policies, and Practice  
Opening Session  
Grand Ballroom 8:30–10:15 a.m.  
Moderators: Julie L. Gerberding and  
Stephen B. Thacker

8:35 a.m.

### **TB or Not TB? That is the Question. . . . An Apparent Outbreak of Tuberculosis Among Mississippi Firefighters, 2006**

**Authors:** John D. Gibbins, E. Page, R. Driscoll, B. Bernard

**Background:** An estimated 1.1 million firefighters in the United States are at potential risk for tuberculosis (TB) exposure while performing first responder duties. Additionally, firefighters live in close quarters on duty and living conditions could facilitate rapid spread of TB among co-workers; therefore, the National Fire Protection Association (NFPA) “Standard on Comprehensive Occupational Medical Programs for Fire Departments” mandates annual firefighter TB screening. Annual screening at a Mississippi fire department found 12 (11.5%) of 104 firefighters had positive tuberculin skin tests (TSTs)  $\geq 10$ mm induration from 2005–2006. All prior TST results were negative. Fire Department management requested a NIOSH Health Hazard Evaluation to determine exposure source.

**Methods:** We conducted a tuberculosis risk assessment of the fire department, evaluated emergency response protocols, and reviewed the contract hospital’s TST procedures. Additionally, we interviewed and tested TST

positive firefighters with Quantiferon®–TB Gold, an enzyme-linked immunosorbent assay test more specific for *Mycobacterium tuberculosis*.

**Results:** Our tuberculosis risk assessment showed department firefighters were at low risk for infection; additionally, Quantiferon®–TB Gold testing was negative in 12 (100%) of 12 participants. We found discrepancies in two-step TST interpretation; the hospital had recently switched from Tubersol® to Aplisol® purified protein derivative (PPD). Re-testing with Tubersol® was negative in 9 (90%) of 10 participants (two were unavailable for re-testing).

**Conclusion:** We concluded that the 12 firefighters were not infected with *Mycobacterium tuberculosis*. Most false-positive TSTs were due to changing PPD brand and improper TST interpretation. One was likely due to infection with non-tuberculosis mycobacteria, commonly found in the southeastern United States. Our investigation highlights the limitations of TST and emphasizes the importance of implementing standard (CDC) protocols.

**Keywords:** tuberculosis, tuberculin skin testing, emergency medical services, Quantiferon®–TB Gold

**8:55 a.m.**

**Investigation of a Nephrogenic Fibrosing Dermopathy Cluster Among Patients with Renal Failure — St. Louis, 2006**

**Authors:** Alexander J. Kallen, M. Jhung, T. Hess, S. Cheng, G. Turabelidze, L. Abramova, G. Saab, M. Arduino, P. Patel

**Background:** Nephrogenic Fibrosing Dermopathy (NFD) is a newly-described, debilitating disorder of unknown etiology that occurs among persons with renal disease. More than 460,000 Americans with advanced renal disease are potentially at risk. Commonly used medications, including erythropoietin and gadolinium-containing contrast (GCC) for magnetic resonance imaging (MRI), have been suggested as possible causes. In May 2006, a NFD cluster was identified at Hospital A in St. Louis, Missouri; an investigation ensued to evaluate the cluster and identify NFD risk factors.

**Methods:** Cases were ascertained from dermatology and pathology records. Confirmed cases were renal patients evaluated at Hospital A between January 2000 and August 2006 with characteristic clinical (skin thickening/hardening) and histopathologic findings of NFD; suspect cases had clinical or histopathologic findings. Each confirmed case and three controls, matched by diagnosis date and location, were included in a case-control study if records were available.

**Results:** Twenty-eight cases were identified at Hospital A between December 2002 and August 2006. Patient demographics were similar among case-patients (n=19) and controls (n=57). In univariate analysis, receipt of GCC in the preceding year (matched odds ratio [MOR] 7.99, 95% confidence interval [CI] 2.22-28.77); dependent edema (MOR 7.11, 95% CI 1.95-25.82); history of deep venous thrombosis (MOR 5.05, 95% CI 1.25-20.42); and diagnosed hypothyroidism (MOR 4.10, 95% CI 1.14-14.70) were associated with NFD. Case-patients were not significantly more likely than controls to have received high-dose (greater than group median) erythropoietin. In multivariate analysis, receipt of GCC (MOR 8.97, 95% CI 1.28-63.01) remained associated with NFD.

**Conclusion:** Receipt of gadolinium-containing MRI contrast was associated with NFD. Use of these agents should be avoided when possible in patients with advanced renal disease.

**Keywords:** skin abnormalities, fibrosis, dermopathy, renal disease, gadolinium, magnetic resonance imaging, erythropoietin

**9:15 a.m.**

**Trends in Intussusception Hospitalization Among U.S. Infants, 1993–2004: Implications for Monitoring the Safety of the New Rotavirus Vaccine Program — United States**

**Authors:** Jacqueline E. Tate, L. Simonsen, C. Viboud, C. Steiner, M. Patel, A. Curns, U. Parashar

**Background:** In 2006, a new routine infant vaccination program began in the US to control rotavirus, the leading cause of severe pediatric gastroenteritis. Because a previous rotavirus vaccine was withdrawn in 1999 after it was associated with intussusception, a severe bowel obstruction, monitoring for this potential adverse event is important. As natural intussusception cases temporally related to the new vaccine will occur by chance, estimates of baseline intussusception rates are needed to ascertain whether observed rates exceed expected rates.

**Methods:** Using the Healthcare Cost and Utilization Project's State Inpatient Database that captures ~88% of all US hospital discharges from 39 states in recent years, we examined hospitalizations among infants (<12 months) with an ICD-9-CM code for intussusception (560.0) during 1993-2004. Incidence rates by various demographic characteristics were calculated using 2000 census data. Rate ratios (RR) with 95% confidence intervals (95% CIs) were calculated using Poisson regression.

**Results:** The overall intussusception hospitalization rate in US infants declined from 47/100,000 in 1993 to 35/100,000 in 2004. Rates were very low for infants <9 weeks of age (~5/100,000), then increased rapidly peaking at ~64/100,000 at 26-29 weeks, before declining slowly to 27/100,000 at 52 weeks. Compared to rates among non-Hispanic white infants (28/100,000), rates were greater among non-Hispanic black infants (43/100,000, [RR=1.6, 95% CI=1.4-1.8]) and Hispanic infants (54/100,000, [RR=1.9, 95% CI=1.7-2.1]). However, rates did not differ by race/ethnicity in infants <4 months.

**Conclusion:** This assessment of intussusception hospitalization rates among US infants provides pre-vaccine baseline rates for comparison with rates observed among vaccinated infants. It will be vital to adjust expected baseline rate calculations to reflect demographics of the vaccinated population, especially age at vaccination because rates varied ~12-fold during infancy.

**Keywords:** intussusception, rotavirus, vaccination, adverse event

9:35 a.m.

**Multistate Outbreak of *Escherichia coli* O157:H7 from Lettuce Consumed at a National Fast Food Chain — Northeastern United States, November–December 2006**

**Authors:** Samir V. Sodha, K. Wannemuehler, M. Iwamoto, T. Ayers, M. Hoekstra, T. Nguyen, A. Sheth, C. Olson, M. Lynch, M. Joyner, K. Hise, A. Langer, M. Glenshaw, M. Malavet, L. McHugh, C. Tan, J. Schaffzin, D. Hoefler, T. Chen, C. Braden, and Outbreak Investigations Team

**Background:** *Escherichia coli* O157:H7 causes an estimated 70,000 illnesses, 2,000 hospitalizations, and 60 deaths annually. Contamination of ground beef, a predominant vehicle, is decreasing; investigations of recent outbreaks have implicated leafy green vegetables as a continuing problem. We investigated a multistate outbreak of *E. coli* O157:H7 infections in November–December 2006 among patrons of restaurant chain A.

**Methods:** We conducted a matched case-control study. A case was defined as *E. coli* O157:H7 infection during the outbreak period in a person who consumed chain A food. Confirmed cases were those whose isolates matched the outbreak strain pulsed-field gel electrophoresis (PFGE) pattern. Controls were well persons who consumed food at implicated chain A restaurants during the outbreak timeframe.

**Results:** We identified 78 cases (67 confirmed) with chain A exposure in 4 states—Delaware, New Jersey, New York, and Pennsylvania. Fifty-five (71%) patients were hospitalized, and 7 (9%) developed hemolytic uremic syndrome; none died. Among 68 patients interviewed, lettuce was the most common ingredient consumed (64 patients [94%]). In a multi-variable model (51 cases; 84 matched controls) both lettuce and cheese were significantly associated with illness (matched OR 6.1, 95% CI 1.4–42.9; mOR 7.1, CI 1.5–71.1, respectively), when controlling for age. Cheddar cheese was pasteurized and widely distributed; shredded iceberg lettuce, an uncooked ingredient, had regional distribution consistent with the outbreak.

**Conclusion:** The case-control study and epidemiologic evidence identified iceberg lettuce as the likely source of *E. coli* O157:H7 infections in this large multistate outbreak. The outbreak reinforces the continuing risk of *E. coli* O157:H7 infections from green leafy vegetables. Industry and regulatory interventions are needed to prevent *E. coli* O157:H7 contamination of green leafy vegetables.

**Keywords:** *Escherichia coli* O157, diarrhea, outbreak, lettuce

9:55 a.m.

**Cardiovascular Disease and Depression, Behavioral Risk Factor Surveillance System — Utah, 2005**

**Authors:** Juliana S. Grant, M. Friedrichs, K. Nellist, K. Marti, R. Rolfs

**Background:** Depression is associated with increased reinfarction and all-cause mortality in persons with cardiovascular disease (CVD). Population-based studies examining the association between depression and CVD are limited. In 2005, a validated screening tool for depression, the Patient Health Questionnaire-9 (PHQ9), was added to Utah's Behavioral Risk Factor Surveillance System (BRFSS) survey. We analyzed those data to examine the relation between CVD and depression.

**Methods:** BRFSS is a random-digit-dialed telephone survey of noninstitutionalized persons aged  $\geq 18$  years. We analyzed 2,992 interviews of persons aged  $\geq 35$  years. Respondents were classified as depressed based on criteria from a validated PHQ9 diagnostic algorithm. CVD was determined by self-report of doctor-diagnosed angina, myocardial infarction or stroke. Data were weighted by selection probability, area of residence, age, and sex. Analyses were performed in SUDAAN<sup>®</sup> by using sequential multivariate logistic regression. All models were adjusted for age and sex.

**Results:** CVD was reported by 8.1% (95% confidence interval=6.9–9.2) of Utahans aged  $\geq 35$  years. Depression was reported by 17.9% (95%CI=13.3–24.1) of respondents with CVD compared to 11.4% (95%CI=10.0–12.7) without CVD (OR=1.8; 95%CI=1.2–2.7). When hypertension, education level, smoking and diabetes were adjusted for, no significant relationship was found between depression and CVD (OR=1.3; 95%CI=0.8–2.0). Body mass index and physical activity did not confound the association between depression and CVD.

**Conclusion:** Confounding by hypertension, education level, smoking and diabetes accounted for the apparent association between depression and CVD. This suggests that the relation between depression and CVD is complex and requires further investigation of underlying risk factors and outcomes. Understanding the role of these risk factors is important for guiding appropriate depression interventions among persons with CVD.

**Keywords:** depression, Behavioral Risk Factor Surveillance System, cardiovascular disease, population surveillance, Utah

Monday, April 16, 2007  
Session B: What's There To Lose? — Obesity  
Grand Ballroom  
10:45 a.m.–12:15 p.m.  
Moderator: Kathleen Toomey

**10:50 a.m.**  
**Lack of Association Between Breastfeeding and  
Preschool Age Overweight and At-Risk-for-Overweight  
Among Offspring of Gestational Diabetic Mothers  
— Michigan Birth Cohort, 1995–1999**

**Authors:** Mark D. Gershman, C. Larrieux, V. Grigorescu,  
M. Wilkins

**Background:** Childhood overweight increases the risk for adult obesity and for early development of cardiovascular risk factors. Gestational diabetes (GD) affects approximately 4% of pregnancies annually in the United States; offspring have an increased risk for childhood overweight. Most studies report a protective effect of breastfeeding against childhood overweight; such studies have rarely focused on offspring of gestational diabetic mothers (OGDM). We studied OGDM enrolled in the Women, Infant and Children's (WIC) program to determine whether breastfeeding was protective against childhood at-risk-for-overweight or overweight (age-and-sex body mass index [BMI] 85<sup>th</sup>–95<sup>th</sup> percentile or ≥95<sup>th</sup> percentile, respectively).

**Methods:** We identified GD mother-child pairs by linking 1995–1999 Michigan inpatient hospital discharge and live-birth records. The resulting database was linked with WIC program-based Pediatric and Pregnancy Nutritional Surveillance Systems for BMI and breastfeeding information for children aged 4 years. Logistic regression was used to evaluate the association between breastfeeding and childhood at-risk-for-overweight and overweight.

**Results:** A total of 1202 children met the inclusion criteria; 441 (36.7%) were in the ≥85<sup>th</sup> percentile for BMI. In a multivariable analysis that included adjustment for child's birthweight and gestational age at birth and mother's age, race/ethnicity, and pre-pregnancy BMI, children who were ever breastfed had 0.84 times the odds of having a BMI percentile ≥85 (95% confidence interval=0.65–1.08), compared with children who were never breastfed.

**Conclusion:** Among OGDM enrolled in the WIC program, breastfeeding did not protect them from being in the ≥85<sup>th</sup> percentile for BMI. This finding is not in agreement with a similar recent study. A study using breastfeeding duration as the exposure should be conducted to clarify whether breastfeeding is protective against overweight among OGDM.

**Keywords:** breastfeeding, gestational diabetes, obesity, pregnancy, preschool child

**11:10 a.m.**  
**Unhealthy Dieting Practices: Which Teens Are at  
Highest Risk? — Oregon 2005**

**Authors:** Clinton C. Haley, K. Hedberg, R. Leman

**Background:** Diagnosed eating disorders affect >5 million adolescents in the United States; many more exhibit unhealthy dieting practices such as vomiting or fasting to lose weight. Earlier diagnosis results in more successful treatment. We sought to identify factors associated with unhealthy dieting practices among Oregon adolescents.

**Methods:** Analyzing Oregon's 2005 population-based school survey data from 16,544 8<sup>th</sup> and 11<sup>th</sup> graders, we defined unhealthy dieting practices as, in the past 30 days, vomiting, fasting for ≥24 hours, or taking unprescribed medications to lose weight. In a multivariable model, we analyzed unhealthy dieting by perceived weight status; depression, anxiety; sexual activity; physical or sexual abuse; substance use; harassment; physical fight or arrest; and lack of adult support.

**Results:** Overall, 11.6% (15.9% girls; 7.2% boys) reported unhealthy dieting practices. Adjusting for sex and grade, the multivariable odds ratios (95% confidence intervals) for those with unhealthy dieting practices compared to those without were 3.0 (2.6–3.5) for mental health problems; 2.2 (1.9–2.5) for substance use; 1.5 (1.3–1.7) for abuse; 1.5 (1.3–1.7) for fight or arrest; 1.4 (1.2–1.7) for harassment; and 1.4 (1.1–1.8) for lack of adult support. As the number of unhealthy dieting practices increased (0, 1, 2, 3), so did the prevalence of associated factors: mental health problems (from 24%, 56%, 73%, to 85%, respectively), substance use (27%, 48%, 64%, 71%), and abuse (31%, 52%, 62%, 78%).

**Conclusion:** Unhealthy dieting practices are common among adolescents and are associated with other deleterious behaviors and conditions; the more unhealthy dieting practices, the higher the prevalence of additional problems. Unhealthy dieting practices need to be addressed in the context of other medical and psychosocial issues.

**Keywords:** adolescent; eating disorders; body weight; feeding behavior; diet, reducing; vomiting

**11:30 a.m.**

**Trying to Lose or Maintain Weight During Pregnancy — United States, 2003**

**Authors:** Connie L. Bish, S. Chu, C. Shapiro-Mendoza, A. Sharma, H. Michels Blanck

**Background:** Current pregnancy weight gain recommendations by the Institute of Medicine are 15–40 pounds for healthy birth outcomes. Weight loss or weight maintenance is not recommended. Overweight and obesity are chronic conditions for many women; commitment to weight loss could trump advice to gain weight during pregnancy. In 2003, over 50% of reproductive age women reported trying to lose weight; little is known about weight intentions among pregnant women. Our objective was to determine the prevalence of weight loss or maintenance among U.S. women during pregnancy.

**Methods:** The 2003 Behavioral Risk Factor Surveillance System is a state-based, random-digit-dialed telephone survey of noninstitutionalized, U.S. civilians aged  $\geq 18$  years. We identified women aged 18–44 years who reported being pregnant ( $n=2,512$ ) and assessed the prevalence and 95% confidence intervals (CIs) for trying to lose or maintain weight by selected factors (e.g., demographics, lifestyle, medical conditions).

**Results:** Among women who reported being pregnant, 7.6% (CI=5.8–9.8%) and 33.9% (CI=30.6–37.3%) were trying to lose or maintain weight, respectively. Weight loss efforts were significantly more common among women with body mass indexes  $\geq 35$  kg/m<sup>2</sup> (15.6%; CI=8.9–25.8%) vs. 18.5–24.9 kg/m<sup>2</sup>, with hypertension (20.2%; CI=10.1–36.4%), who drank alcohol (22.7%; CI=15.2–32.4%) or who drank alcohol and smoked (26.6%; CI=14.1–44.4%) vs. neither. Weight maintenance efforts were significantly more common among women aged 35–44 years (48.8%; CI=40.0–57.7%) vs. those aged 18–34 years.

**Conclusion:** Despite guidelines to gain weight during pregnancy, one in 13 pregnant women reported trying to lose weight, and one in three reported trying to maintain weight. Thus, providers may encounter pregnant women whose intentions conflict with guidelines for pregnancy weight gain.

**Keywords:** pregnancy, weight control, overweight, obesity, alcohol consumption, tobacco use

**11:50 a.m.**

**Periconceptional Use of Weight-Loss Products Including Ephedra and the Association with Birth Defects — The National Birth Defects Prevention Study, 1997–2003**

**Authors:** Rebecca H. Bitsko, J. Reefhuis, M. Feldkamp, M. Werler, K. Waller, J. Frias, M. Honein

**Background:** Weight-loss products are used by 13%–17% of reproductive-age women. One common component, ephedra, was banned in 2004 because of health risks, but it is still available illicitly. Because about half of the pregnancies in the United States are unplanned, inadvertent exposures during pregnancy may occur. This study assessed the association between periconceptional use of weight-loss products, including ephedra, and birth defects, a leading cause of infant mortality.

**Methods:** Mothers of infants with birth defects (case-infants) and a random sample of live births (control-infants) born during 1997–2003 in 10 states participated in the National Birth Defects Prevention Study. Mothers self-reported their periconceptional use (1 month before conception through the first trimester) of medications and supplements, including weight-loss products. Adjusted odds ratios (aOR) for the association between weight-loss products and 17 birth defects were calculated controlling for maternal race, age, education, plurality, pregnancy weight gain, and folic acid consumption.

**Results:** Preliminary analyses found that periconceptional use of weight-loss products was reported by 2.4% of mothers of control-infants (2.3% of non-overweight; 2.7% of overweight) and 2.7% of mothers of case-infants (2.4% of non-overweight; 3.2% of overweight); 42% of products used contained ephedra. Use of any weight-loss product was associated with anencephaly (aOR=2.6, CI=1.2–5.7) and nonsignificantly associated with anorectal atresia (aOR=1.6 CI=0.9–3.0). Use of products containing ephedra was associated with anencephaly (aOR=3.5, CI=1.2–9.9), and nonsignificantly associated with anorectal atresia (aOR=2.0, CI=0.9–4.6), and cleft lip (aOR=2.2, CI=1.0–5.0).

**Conclusion:** These results suggest an association between periconceptional use of weight-loss products containing ephedra and certain birth defects. If these findings are replicated, preconception messages should promote appropriate nutrition and exercise and discourage use of weight-loss products.

**Keywords:** birth defects, pregnancy outcome, ephedra, appetite suppressants, weight loss

Monday-Friday Poster Session, Meet the Authors  
Grand Ballroom 12:30–1:30 p.m.

Posters 1–5: “Refreshments Will Be Served” —  
Foodborne Illness

Posters 6–9: Unhealthy Care — Health Care

Posters 10–17: All Along the Watchtower — Surveillance

#### Poster 1

### Too Many Months Without an R: An Outbreak of *Vibrio parahaemolyticus* Infections Among Consumers of Raw Oysters — Washington, 2006

**Authors:** Reena K. Gulati, J. MacDonald, R. Lillie, J. DeLoach, J. Hofmann

**Background:** Washington State harvests 37% of oysters consumed in the United States. To ensure shellfish safety, the Washington State Department of Health (DOH) Office of Shellfish and Water Protection conducts surveillance for thermostable direct hemolysin (*tdh*)+ *Vibrio parahaemolyticus* (Vp) in oysters harvested during summer months. In July 2006, DOH received an increasing number of reports of vibriosis attributed to oysters harvested in the state. We investigated this outbreak to determine its extent, identify the source of implicated oysters, and institute prevention measures.

**Methods:** Patients had laboratory-confirmed vibriosis or clinically compatible illness after consuming raw or undercooked Washington oysters. DOH and local health jurisdictions conducted trace-back and source investigations.

**Results:** During May–August 2006, a total of 159 vibriosis cases occurred; 113 (71%) were associated with oysters consumed in Washington and  $\geq 46$  ( $\geq 29\%$ ) with oysters shipped out of state. No serious illnesses occurred. We identified 25 growing areas where contaminated oysters had been harvested. Based upon case investigations, 20 (80%) were closed to harvest during July 14–October 12. Implicated oysters were recalled from 23 states and eight countries. Reports of outbreak-associated illness declined after harvest closures and product recall. Only 1/25 (4%) sites had *tdh*+ Vp levels that exceeded the action threshold.

**Conclusion:** This is the largest reported outbreak of Vp in Washington, occurring during an unusually warm season. Surveillance for human vibriosis detected this outbreak; cases associated with oyster consumption declined precipitously after public health interventions. Surveillance for *tdh*+ Vp in harvested oysters was ineffective in identifying at-risk harvest beds. As the Pacific Northwest experiences warmer temperatures, improving harvesting methods rather than relying upon *tdh*+ Vp surveillance might be needed to ensure shellfish safety.

**Keywords:** oysters, *Vibrio parahaemolyticus*, outbreak, Washington

#### Poster 2

### Outbreak of Mushroom Poisoning Caused by *Amanita bisporigera*, the Eastern American Destroying Angel — Minnesota, 2006

**Authors:** Stacy M. Holzbauer, D. Anderson, A. Gerenday, R. Spinosa, S. Chute, T. Vang, R. Danila, K. Smith

**Background:** *Amanita* species are common wild mushrooms that if ingested can lead to liver failure and mortality rates of 30%, even with treatment. During 1980–2005, two persons, including one Hmong male, died in Minnesota after consuming poisonous mushrooms. On September 14, 2006, the Minnesota Department of Health received a report from Hospital A of multiple Hmong persons hospitalized after consuming mushrooms. We investigated this outbreak to determine the source of illness and extent of Hmong community knowledge about the dangers of ingesting wild mushrooms.

**Methods:** Patients who had consumed mushrooms and their family members were interviewed; leftover mushrooms were identified. A case was defined as vomiting, diarrhea, or elevated liver enzymes after mushroom ingestion. We also surveyed Hmong-community members to determine knowledge and practices regarding consumption of wild mushrooms.

**Results:** Nine members of an extended Hmong family had consumed mushrooms at two separate meals. All nine persons became ill; the median age of patients was 20 years (range, 5–57 years). Six were hospitalized with a median hospitalization duration of 4 days (range, 1–13 days). A female aged 10-years experienced multiple organ failure and died 13 days after mushroom consumption. Two family members had picked the mushrooms in a local park. A local mushroom specialist identified leftover mushrooms as *Amanita bisporigera*. From the community survey, 25% (95% confidence interval [CI]=9.5–49.4) of Hmong were unaware that harvesting and consuming wild mushrooms can be deadly.

**Conclusion:** Local Hmong-community members appear to lack knowledge of the dangers of consuming wild mushrooms, posing a serious health threat to this community. Culturally appropriate educational campaigns were conducted in the Hmong community to prevent further illness and death.

**Keywords:** mushroom poisoning, *Amanita*, Minnesota, refugees

### Poster 3

#### Public Attitudes Toward Sugar-Sweetened Beverage Availability in Public Schools — HealthStyles Survey, 2004

**Authors:** Celeste M. Philip, M. Cogswell, M. Jefferds

**Background:** Studies indicate sugar-sweetened beverage (SSB) consumption is associated with pediatric overweight. Among high schools with vending machines, canteens, or snack bars, 94% sold SSB in 2000. Some local and state school policies now limit availability of SSB, however little is known about public attitudes toward these policies.

**Methods:** We analyzed responses of 3,858 respondents to three questions from the 2004 HealthStyles survey, an annual national mail panel survey to US adults. Support for limiting beverage sales was indicated by agreement with 1) “public schools should only be allowed to sell water, low-fat milk, and 100% juice on school property” or disagreement with “public schools should be allowed to sell” 2) “full-calorie soda” or 3) “sports drinks.” We used multiple-variable logistic regression to determine how each attitude was associated with sociodemographic characteristics and parental status (parents of children aged 0-4, 5-12, 13-18 years, or in multiple age groups, and adults without children  $\leq$  18 years).

**Results:** Although 56% of respondents support limiting sales to only water, low-fat milk, and 100% juice, fewer respondents support limiting sales of soda (46%) or sports drinks (22%). In general, men (vs. women) and respondents aged 18-24 years (vs. older) were less likely to support limiting SSB. Support for limiting soda was less among parents of children aged 13-18 years (adjusted odds ratios [AOR]=0.63, 95% confidence interval [CI]=0.46-0.85) and adults without children aged  $\leq$  18 years (AOR=0.60, 95% CI=0.47-0.78) vs. parents of children aged 5-12 years.

**Conclusion:** Limiting SSB availability is one strategy to address pediatric overweight. Variations in support of limiting SSB availability should be considered in planning policies and implementing interventions in public schools.

**Keywords:** beverages, attitude, overweight, schools, policy

### Poster 4

#### Multistate Outbreak of *Salmonella* Braenderup Infections Associated with Tomatoes — United States, 2005

**Authors:** Ann M. Schmitz, S. Bidol, M. Gershman, E. Salehi, M. Mohr, T. Duszynski, O. Henao, K. Lindstrom, J. Lockett, FDA Investigative Team, J. Painter

**Background:** *Salmonella* causes an estimated 1.4 million U.S. illnesses annually. The number of outbreaks caused by produce, especially tomatoes, has increased over the last two decades. During November and December, 2005, ten states reported 82 persons with *Salmonella* Braenderup (SB) infection with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns.

**Methods:** We conducted a case-control study among cases in three states. A case was defined as infection with SB yielding the outbreak PFGE pattern and illness onset after November 15. Zip code-matched controls were identified through reverse phone directories. Traceback was conducted by the Food and Drug Administration.

**Results:** We enrolled 51 cases and 153 controls. Case-patients had a median age of 35 years; 67% were female. Twenty-four (48%) of 50 case-patients but only 17 (12%) of 143 controls ate at fast food Chain A (matched odds ratio [mOR]=10.2, 95% confidence interval [CI]=3.0-27.1). The association with Chain A was strongest among Ohio and Michigan cases (mOR=19.9, CI=4.6 - 86.6). Indiana case-patients were not associated with Chain A particularly, but with eating out at restaurants in general (mOR=15.3, CI=1.9-125.4). In Michigan and Ohio, 15 (83%) of 18 Chain A-associated case-patients but only 4 (31%) of 13 controls ate foods containing diced tomatoes (odds ratio [OR]=11.3, CI=2.0-62.2). Traceback identified a tomato processor that may have used improper wash procedures and a Florida farm from which environmental specimens yielded *Salmonella*.

**Conclusion:** Diced tomatoes were the source of illness among Chain A and non-Chain A cases. Tomato contamination most likely occurred at the farm and may have been exacerbated during processing. Improved understanding of how tomatoes are contaminated is needed so preventive measures can be applied by growers, packers, and processors.

**Keywords:** *Salmonella* infections, tomatoes, outbreaks, traceback investigation

## Poster 5

### Outbreak of *Escherichia coli* O157 Associated with Packaged Spinach — Wisconsin, 2006

**Authors:** Arthur M. Wendel, J. P. Davis, D. H. Johnson, J. R. Archer, S. Ahrabi-Fard, U. Sharapov, J. S. Grant, A. Karon, C. Koschmann, T. Monson.

**Background:** *Escherichia coli* O157:H7 (O157) is a frequent cause of hemorrhagic colitis and hemolytic uremic syndrome (HUS). In September 2006, the Wisconsin Division of Public Health and State Laboratory of Hygiene linked geographically-dispersed O157 illnesses with matching pulsed-field gel electrophoresis (PFGE) patterns and uploaded these patterns to PulseNet. Subsequently, other states' PFGE patterns among O157 isolates matched the Wisconsin pattern. Frequent initial patient characteristics included adult age, female sex, and spinach consumption.

**Methods:** We conducted a case-control study; controls (n=86) were matched by age, sex, and residential location using a reverse telephone directory. Case definition criteria included Wisconsin residency, culture-confirmed O157 infection, outbreak PFGE pattern, and August–September illness onset. Questionnaire content included recent O157-related risk factors, food consumption, and spinach consumption details. Conditional logistic regression and exact confidence intervals (CI) were used. Case-patients' opened spinach packages were retrieved for culture and PFGE analysis of O157 isolates.

**Results:** Among 49 case-patients (median age=26 years, range=1–84 years), 35 were female; 24 were hospitalized; 9 developed HUS; and one died (illness onsets=August 20–September 14). Symptoms included bloody diarrhea (88%) and abdominal cramps (96%). Forty-five case-patients reported fresh spinach consumption (matched odds ratio [mOR]=57.2; 95% CI=9.5–>1000). Twenty-three case-patients recalled Brand A spinach consumption; on multibrand analysis, only Brand A was associated with illness (mOR=undefined; 95% CI=5.5–infinity). Wisconsin's agriculture laboratory isolated the outbreak strain from spinach in two Brand A packages.

**Conclusion:** Brand A spinach was implicated in this multistate outbreak using case-control methods and cultures of prepackaged spinach. The rapid multijurisdictional epidemiologic and laboratory response, including timely PFGE analysis and PulseNet posting, facilitated aggressive control measures and prompt voluntary recall of Brand A spinach.

**Keywords:** *Escherichia coli* O157, spinach, PFGE, packaged salad

## Poster 6

### Outbreak of *Acinetobacter*-Related Infections Among Patients in Two Hospitals — Kentucky, 2006

**Authors:** Suzanne F. Beavers, D. Blossom, K. Kawaoka, A. Wong, D. Thoroughman, A. Srinivasan

**Background:** *Acinetobacter* species are frequently highly resistant to antimicrobials, and can cause morbidity and mortality among critically ill patients. On September 29, 2006, Hospital A notified the Kentucky Department for Public Health of an *Acinetobacter* outbreak in their facility. On October 3, 2006, Hospital B contacted CDC regarding a similar outbreak. We investigated both outbreaks to determine risk factors for infection.

**Methods:** We performed case-control studies at both hospitals. We defined a case as  $\geq 1$  positive *Acinetobacter* clinical specimen culture recovered from a patient during August 1, 2006–October 31, 2006 (Hospital A) or April 1, 2006–October 31, 2006 (Hospital B). Controls were systematically selected from patients with length-of-stay greater than or equal to the mean-admission-to-positive-culture interval for case-patients. We also observed infection control practices.

**Results:** We identified 29 cases and 33 controls at Hospital A, and 72 cases and 71 controls at Hospital B. Median case-patient age was 43 years (range=0–74 years) and 46 years (range=15–89 years) in Hospital A and B respectively. At time of diagnosis, 71.4% (Hospital A) and 72.2% (Hospital B) of patients were in the intensive-care unit (ICU). The majority of positive cultures were from sputum (51.7% in Hospital A, 62.5% in Hospital B). *Acinetobacter* infection was associated with mechanical ventilation [odds ratio (OR)=27.7; 95% confidence interval (CI)=7.0–110.3, Hospital A; OR=6.1, 95% CI=2.8–12.8, Hospital B], and presence of tracheostomy [OR=8.0, 95% CI=1.6–41.3, Hospital A; OR=2.9; 95% CI=1.4–5.8, Hospital B]. Observations revealed important breaches in infection control procedures related to respiratory therapy.

**Conclusion:** Failure to comply with respiratory infection control recommendations likely contributed to these *Acinetobacter* outbreaks. Improved infection-control practices, particularly in the ICU setting, are being implemented at both hospitals.

**Keywords:** *Acinetobacter*, nosocomial infection, case-control studies, epidemiology

## Poster 7

### Investigation of *Mycobacterium chelonae/abscessus* Cultures from Three Health-Care Facilities — Pennsylvania, 2002–2006

**Authors:** Tai-Ho Chen, A. Weltman, K. Waller, L. Dettinger, D. Blossom, M. Arduino, A. Srinivasan

**Background:** *Mycobacterium chelonae/abscessus* group are acid-fast bacilli (AFB) associated with pulmonary colonization or infection and pseudooutbreaks from contaminated bronchoscopy equipment. Pennsylvania Department of Health was notified July 2006 that two neighboring hospitals (A and B) had, since 2002, recorded increased *M. chelonae/abscessus* cultures from bronchoscopies. We conducted an investigation to identify the outbreak source and to prevent future transmission.

**Methods:** We reviewed patient records, bronchoscopy information, and respiratory culture results for all patients with bronchoscopy AFB cultures collected at either hospital during January 2002–August 2006. We defined a case-patient as a patient with one or more positive *M. chelonae/abscessus* bronchoscopy cultures. We compared case-patients with patients who had undergone bronchoscopy without positive *M. chelonae/abscessus* cultures. Environmental AFB specimens were collected from both hospitals and a long-term-care facility (LTC-A) serving ventilator-dependent adults where the majority of case-patients resided.

**Results:** Among 28 case-patients with 120 positive *M. chelonae/abscessus* bronchoscopy cultures, 25 (89%) were LTC-A residents. Hospital A diagnosed 21 case-patients from 940 bronchoscopy patients with AFB cultures collected; 19 (90%) case-patients were LTC-A residents (risk ratio [RR]=141.1; exact 95% confidence interval [CI]=32.3–1259.0). Similarly, 6/7 (86%) case-patients diagnosed at Hospital B were LTC-A residents (RR=40.6; exact 95% CI=4.7–1871.4). The same decontamination procedures and bronchoscopes were used for LTC and non-LTC patients at each hospital. Hospital environmental AFB cultures were negative; 7/10 (70%) LTC-A tap water cultures were *M. chelonae/abscessus* positive.

**Conclusion:** Our investigation determined that antecedent colonization with *M. chelonae/abscessus* among LTC-A patients was the most likely explanation for this outbreak. Contaminated hospital bronchoscopy equipment was not the source. We recommended that LTC-A review tap water usage among patients to prevent respiratory exposure.

**Keywords:** disease outbreaks; *Mycobacterium chelonae*; bronchoscopy; respiration, artificial

## Poster 8

### Outbreak of *Enterococcus gallinarum* Infections After Total Knee Arthroplasties — Ohio, 2006

**Authors:** Michael P. Cooper, F. Lessa, B. Brems, S. Iiames, R. Shoulson, A. Peterson, B. Jensen, S. York, J. Noble-Wang, L. McDonald, E. Koch, R. Duffy

**Background:** Nationally, 2% of total knee arthroplasties (TKA) develop prosthesis infections causing substantial morbidity and mortality. *Enterococci* are implicated in 3% of such infections, with *Enterococcus faecalis* or *Enterococcus faecium* implicated most (>95%). In August 2006, Ohio's Department of Health was notified of multiple knee prosthesis infections at Hospital A, caused by *E. gallinarum*, a Gram-positive bacterium intrinsically resistant to vancomycin. We conducted an investigation to identify risk factors, determine the source of the outbreak, and prevent future cases.

**Methods:** We conducted a retrospective cohort study, identifying all TKA patients at Hospital A during January 1–August 31, 2006. Patients had *E. gallinarum* isolated from knee aspirates, confirmed by biochemical testing, and compared by pulsed-field gel electrophoresis. We obtained environmental samples, interviewed and obtained stool cultures from hospital staff, and reviewed infection-control procedures.

**Results:** Hospital A had 133 TKA patients; eight (6%) experienced knee prosthesis infections with the same strain of *E. gallinarum*. In bivariate analysis, patients were more likely than nonpatients to have Surgeon A (crude risk ratio [RR]=14.3; 95% confidence interval [CI]=3.1–67.0; p<0.001); spinal anesthesia (RR=undefined); Anesthesiologist A (RR=6.5; 95% CI=1.7–25.7; p=0.01); triple antibiotic irrigation (RR=9.6; 95% CI=1.2–76.0; p=0.01); and Nurse A (RR=6.3; 95% CI=0.8–49.8; p=0.04). Staff cultures were negative for *E. gallinarum*; environmental inspection was unrevealing, and no major infection-control breaches were identified.

**Conclusion:** This was the first recorded outbreak of joint prosthesis infections resulting from *E. gallinarum*. Our investigation did not identify the source of the infections, but we hypothesize that a contamination of a device or of the environment was a potential source. We recommended increased surveillance and continued attention to infection-control practices.

**Keywords:** enterococcus, *Enterococcus gallinarum*, total knee replacement, knee prosthesis, disease outbreak

## Poster 9

### Outbreak of *Pseudomonas aeruginosa* Infections Following Cardiovascular Surgery — Indiana, 2006

**Authors:** Katherine D. Ellingson, A. Kallen, K. Hagerich, J. Hageman, M. Pearson, J. Noble-Wang, M. Arduino, A. Srinivasan

**Background:** Gram-negative bacteria, including *Pseudomonas aeruginosa*, account for 35-50% of healthcare-associated infections in cardiac surgery patients. Over a five-month period, Hospital A noted a cluster of *P. aeruginosa* infections in postoperative cardiovascular (CV) surgery patients. We sought to identify the outbreak's etiology and develop preventative recommendations.

**Methods:** We defined cases as CV surgery patients with a positive *P. aeruginosa* culture and fever ( $\geq 100.4^{\circ}$ ) or elevated white blood cell count ( $\geq 11,000$  WBC/mm<sup>3</sup>) in Hospital A's post-surgical intensive care unit (PSICU), from May through September, 2006. Randomly selected controls, frequency matched by surgery type, underwent CV surgery during this period. We collected and analyzed case-control data, obtained environmental samples, and observed surgical and postoperative procedures.

**Results:** Eight patients met the case definition, four of whom died. In adjusted case-control analyses, risk factors included number of PSICU days ( $p=.02$ ) and vascular catheter days ( $p=.01$ ). Cases also had higher odds of receiving a non-commercially prepared respiratory therapy medication (aOR=7.2, 95% CI=1.2-43.4), which was mixed at patients' bedsides and administered through multiuse devices. We observed suboptimal cleaning of these devices and breaches in hand hygiene by PSICU staff. *P. aeruginosa* was recovered in low concentrations from PSICU tap water. No case isolates were available for typing, but antibiograms of case and water isolates were identical.

**Conclusion:** Infections likely resulted from extrinsic contamination of multiuse medical devices and insufficient hand hygiene in combination with low levels of *P. aeruginosa* in the PSICU water supply. We recommended proper disinfection and drying of multiuse respiratory therapy devices and vigilant hand hygiene when mixing medications and caring for patients with vascular catheters. Since implementation of recommended procedures, Hospital A has detected no additional cases.

**Keywords:** *Pseudomonas aeruginosa*, hospital outbreak, cardiovascular surgery, respiratory care

## Poster 10

### Rates of Stool Culture and Antimicrobial Use for Diarrhea — Tennessee, 1995–2004

**Authors:** L. Rand Carpenter, S. Pont, W. Cooper, M. Griffin, W. Schaffner, T. Jones

**Background:** Diarrhea and acute gastroenteritis affect >200 million persons in the United States annually. Stool cultures are important for surveillance and guiding therapy for diarrhea. Data are limited regarding rates of obtaining laboratory studies and the frequency of antimicrobial treatment of diarrheal disease.

**Methods:** We performed a retrospective analysis of Tennessee Medicaid data for 1995–2004. A diarrhea episode was defined as an emergency department or outpatient clinic visit (or series of visits within 30 days) with a diagnosis of diarrhea identified by ICD-9 codes. Diagnostic stool studies and prescription of antimicrobials within 7 days of a diarrheal episode were identified. We analyzed for outcomes of stool culture and antimicrobial prescription controlling for age, race, sex, urban residence, and acute respiratory infection.

**Results:** Analysis of 11.6 million person-years of Medicaid enrollment data identified 315,828 diarrhea episodes among persons aged <65 years; stool cultures were performed in 15,820 (5%). Of 32,949 episodes with antimicrobial prescription, 29,445 (89%) were not accompanied by a stool culture. Adults (>18 years) were more likely than children to be prescribed antimicrobials (relative risk [RR]=2.21; 95% confidence interval [CI]=2.17–2.26) and less likely to have stool culture performed (RR=0.76; CI=0.73–0.78). Nonblack race (RR=1.22; CI=1.17–1.27) and urban residence (RR=1.60; CI=1.54–1.65) were associated with higher rates of stool culture. A concurrent diagnosis of acute respiratory infection was associated with a lower rate of stool culture (RR=0.58; CI=0.53–0.63).

**Conclusion:** Patients with diarrhea rarely have a diagnostic stool culture submitted. Additionally, the majority of treatment with antimicrobials is empirical and without use of stool culture. These practices have critical implications for public health surveillance, patient care, and appropriate antimicrobial use.

**Keywords:** diarrhea, antimicrobials, laboratory techniques and procedures, population surveillance

## Poster 11

### The Impact of Workplace Surveillance on an Enhanced Preventive Program To Reduce Beryllium Sensitization — Tucson, Arizona, 2000–2004

**Authors:** Kristin J. Cummings, C. Schuler, D. Deubner, K. Kreiss

**Background:** At least 130,000 U.S. workers exposed to beryllium may be at risk for chronic beryllium disease, an immune-mediated lung disease that can cause disability and death. Workers developing beryllium sensitization, detected with the blood beryllium lymphocyte proliferation test (BeLPT), are at higher risk. A 1998 survey at a beryllium plant found 10% (7/70) of workers hired within five years had sensitization. The plant enhanced its preventive program, assessing effectiveness with medical and environmental surveillance. In the subsequent five years, sensitization prevalence fell to 1% (1/97 new workers). We aimed to evaluate the impact of surveillance on the preventive program's evolving content.

**Methods:** Medical surveillance included hire and employment interval BeLPTs from 1/2000-12/2004. Sensitization was defined as a confirmed abnormal result after hire. Environmental surveillance included beryllium sampling of air from 2000-2003 and of currently employed workers' hands in 2001. Using plant records, we classified a preventive program change as surveillance-driven if it was an otherwise unplanned change following detection of sensitization or elevated beryllium levels.

**Results:** Medical surveillance detected one case of sensitization among 97 new workers. Four percent of air samples exceeded the permissible exposure limit (2.0  $\mu\text{g}/\text{m}^3$ ) and 50% exceeded the action level (0.2  $\mu\text{g}/\text{m}^3$ ). Nearly all (120/122) workers tested had detectable beryllium on their hands. Thirty-six preventive program changes occurred from 2000-2004, including engineering (e.g., machine enclosures), administrative (e.g., cleaning policies), and protective equipment (e.g., respirators, skin covering) changes. Eighteen (50%) were surveillance-driven: four medical, nine environmental, five both.

**Conclusion:** Analysis of surveillance data substantially impacted the content of a beryllium plant's preventive program, contributing to sensitization decline as well as demonstrating its usefulness for improving workplace disease prevention programs.

**Keywords:** beryllium disease, immunologic sensitization, worksite, surveillance

## Poster 12

### Compliance with Recommendations for Japanese Encephalitis Vaccination Among U.S. Travelers to Asia

**Authors:** Mark R. Duffy, N. Hayes, H. Baggett, C. Reed, A. Plummer, J. Bateman, M. Becker, S. Kuhn, T. Badsgard, A. Whatley, M. Fischer

**Background:** Japanese encephalitis (JE) vaccination is recommended for travelers to Asia whose itineraries increase their risk of exposure to JE virus. An estimated 1% of U.S. travelers to Asia receive JE vaccine; however, the proportion of travelers for whom JE vaccination is warranted is unknown. We performed a pilot survey to estimate the proportion of U.S. travelers to Asia who receive JE vaccine according to the Advisory Committee on Immunization Practices (ACIP) recommendations.

**Methods:** We surveyed U.S. residents  $\geq 18$  years of age awaiting departure on eight direct flights from New York City to Beijing or Bangkok from August 28 to September 1, 2006. We asked participants about travel plans, JE vaccination status, and potential barriers to vaccination. For this study, travelers planning to spend  $\geq 30$  days in Asia or  $\geq 50\%$  of their trip in rural areas were defined as persons for whom JE vaccination should have been considered due to increased risk of JE virus exposure.

**Results:** Of 514 eligible travelers contacted, 325 (63%) responded. Among the 325 participants, 123 (38%) described itineraries for which JE vaccination should have been considered, but only 13 (11%) received JE vaccine. Of the 110 unvaccinated at-risk travelers, 63 (57%) visited a health care provider (HCP) to prepare for the trip. Of the 63 unvaccinated at-risk travelers who visited a HCP, 43 (68%) indicated that their HCP had not offered or recommended JE vaccination.

**Conclusion:** Almost 90% of surveyed travelers with planned itineraries warranting JE vaccination were not vaccinated. These preliminary results support further evaluation of JE vaccine coverage among U.S. travelers to Asia, and indicate a need to educate travelers and health care providers about JE vaccine recommendations.

**Keywords:** Japanese encephalitis, Asia, vaccination, survey

### Poster 13

#### Evaluation of Laboratory Surveillance for Lyme Disease — New Jersey, 2001–2006

**Authors:** Adam J. Langer, L. McHugh, S. Brynildsen, F. Sorhage, C. Robertson, C. Tan, D. Bensyl

**Background:** Lyme disease (LD) is endemic in the U.S. Northeast and upper-Midwest, and it became a nationally notifiable disease in 1991. Increased reporting, particularly from electronic laboratory reports, results in New Jersey (NJ) health departments (HDs) receiving >7,500 annual LD reports. We evaluated the accuracy of LD laboratory reporting as a representation of actual cases. We also evaluated the system's resource-intensiveness.

**Methods:** We analyzed aggregate LD data for 2001–2006 and calculated predictive value positive (PVP), representing accuracy of initial reports. CDC defines a confirmed case as presence of an erythema migrans rash, or one or more late clinical manifestation plus laboratory confirmation. We also calculated stratified PVP for electronic laboratory reports (ELR) versus other reports. We evaluated resource-intensiveness by using a sample of reports from the same period, analyzing time from initial report to case-status determination.

**Results:** Overall, 15,335 confirmed cases were reported out of 40,954 total (PVP: 37%); 4,448 confirmed ELR reports out of 21,050 total (PVP: 16%); and 11,887 confirmed other reports out of 19,904 total (PVP: 60%). Median investigation time was 2 months (range: <1 week–8 months). LD investigations require 1.75 full-time-equivalent positions on the state level.

**Conclusion:** Laboratory reporting has poor PVP, requiring considerable investment in investigations. The increasing investigation volume is unsustainable given available resources. We recommend modifying the case definition to minimize laboratory-report investigations, unless a health-care provider also reports the case. We do not recommend eliminating laboratory reporting, because laboratory data might have future uses. Our recommendation will reduce investigation workload, potentially allowing for improved investigations. Failure to address investigation burden might result in compromising other priorities as HDs divert resources to LD investigations.

**Keywords:** Lyme disease; disease notification; program evaluation; surveillance; *Borrelia*; *Ixodes*

### Poster 14

#### Cancer Incidence Among Children and Adolescents in the United States, 2001–2003

**Authors:** Jun Li, S. Stewart, J. Miller, T. Thompson, L. Pollack

**Background:** Cancer is the leading disease-related cause of death among youths aged 1–19 years. Although several studies have indicated a slight increase in the incidence of childhood cancer before 2000, recent information on incidence, especially on how it varies by location, is minimal.

**Methods:** We examined data from the 39 National Program of Cancer Registries and five Surveillance, Epidemiology, and End Results statewide registries (representing 90% of the U.S. population) to identify cancer diagnosed among youths aged 0–19 years between 2001 and 2003. Patients were divided into 12 diagnostic groups using the third edition of International Classification of Childhood Cancer and stratified by sex, age, race/ethnicity, and region. We estimated age-adjusted incidence rate (AIR) per million, rate ratio (RR) and the corresponding 95% confidence interval (CI).

**Results:** We identified 36,446 childhood cancer patients with an AIR of 165.9 per million. For all cancers combined, incidence was higher among boys than girls (RR=1.11; 95% CI=1.09–1.13) and higher among adolescents (15–19 years) than children (0–14 years) (RR=1.39; 95% CI=1.36–1.43). Overall, whites had the highest AIRs in leukemias (46.2), brain tumors (30.8), lymphomas (25.1), and neuroblastomas (8.7). The youths (0–19 years) living in the Northeast had the highest AIRs in brain tumors (32.6), lymphomas (27.6), soft tissue sarcomas (13.0), and neuroblastomas (9.7). The youths living in the West had the highest AIR in leukemias (46.8).

**Conclusion:** Our study is the first to demonstrate regional differences in childhood cancer incidence. It also shows that variations in cancer incidence by sex, age, and race/ethnicity still exist between 2001 and 2003. Further analysis of these regional variations may help to generate new hypotheses about the cause of childhood cancer.

**Keywords:** neoplasm, child, adolescent, incidence, SEER program

## Poster 15

### Homicide Surveillance: Consistency and Comprehensiveness of Multiple-Source Documentation — United States, 2003–2004

**Authors:** Joseph E. Logan, D. Karch

**Background:** Homicide is an important health problem in the United States. In 2004, it accounted for 17,357 total deaths and was the 3rd leading cause of death for those aged 20-34 years. To assist homicide prevention efforts, the National Violent Death Reporting System (NVDRS) links multiple documents (i.e. death certificates [DC], coroner/medical examiner reports [C/MER], and police reports [PR]) to capture homicide victim demographics, event variables (e.g., place/date of death), and preceding circumstance information (e.g., motives of crime). However, variable and circumstance inconsistencies and missing information between the different sources can limit the ability to develop and analyze prevention programs and policies.

**Methods:** The 2003-2004 NVDRS dataset contained 5,737 homicide incidents, representing 7 states in 2003 (AK, MD, MA, NJ, OR, SC and VA) and 13 states in 2004 (original 7 plus CO, GA, NC, OK, RI and WI). We calculated the consistency of demographic and event variables by the percent of incidents with identical data codes/values across all documents. We assessed the value of adding C/MERs to PRs in capturing circumstance information by calculating the percent increase of incidents identified by C/MERs as having a particular circumstance beyond those identified by the PR.

**Results:** Demographic variables matched from 70.9% (marital-status) to 99.9% (race). Event variables matched from 73.9% (place-of-death) to 95.6% (date-of-death). Identification of all homicide circumstances increased by 13.0 to 92.3% after adding the C/MERs to the PRs, particularly homicides resulting from helping other victims (92.3%-increase), drug involvement (43.1%-increase), and jealousy (31.8%-increase).

**Conclusion:** Analysts should consider how between-document inconsistencies in demographic/event variables can affect their findings. Also, while C/MERs provide forensic/medical information on victims, these reports also add substantial information about homicide circumstances.

**Keywords:** homicide, violence, epidemiology, surveillance

## Poster 16

### Hearing Difficulty Attributable to Work in Occupation and Industry: Analysis of National Health Interview Survey — United States, 1997–2003

**Author:** SangWoo Tak

**Background:** Occupational hearing loss (OHL) is permanent and prevalent, thus, prevention is of utmost importance. The lack of surveillance for OHL hinders the estimation of the national burden of hearing loss attributable to occupational exposures at work. High risk industries and occupations should be targeted for implementation of hearing loss prevention programs.

**Methods:** Data on 130,166 employed respondents aged 18–65 years from the National Health Interview Survey from 1997 to 2003 were analyzed to estimate the population prevalence, adjusted odds ratios, and attributable fractions of hearing difficulty associated with employment by industry and occupation, using SUDAAN software. Hearing difficulty was defined as those reporting “a little trouble hearing” or “a lot of trouble hearing.”

**Results:** Twelve percent of US working population reported hearing difficulty. Odds ratios (ORs) for hearing difficulty, adjusted for age, sex, education, and race, were significantly increased for the following industries: railroads (OR=3.8, 95% Confidence Interval [CI]: 2.8, 5.2); mining (OR=2.8, 95% CI: 2.1, 3.9); primary metal manufacturing (OR=2.4, 95% CI: 1.8, 3.0); and utilities (OR=1.8, 95% CI: 1.4, 2.2). Analysis of occupation/industry pairings showed increased odds ratios of hearing difficulty for mechanics and repairers in various industries; machine operators in manufacturing; vehicle operators in transportation; and material moving equipment operators in construction. The fraction of hearing difficulty attributable to work was estimated as 26% nationally. The magnitude of hearing difficulty attributable to occupational exposure was greatest for workers employed in construction, transportation equipment manufacturing, agriculture, and business and repair services.

**Conclusion:** Hearing difficulty was found to be differentially distributed across various industries. In industries with high rates, employers and workers should take preventive action to reduce the risk of OHL.

**Keywords:** occupational hearing loss, hearing difficulty, attributable fraction, industry, occupations

## Poster 17

### Usefulness of Passive Surveillance for Vaccine Preventable Invasive Pneumococcal Disease in Oklahoma

**Authors:** Melissa K. Van Dyke, J. Stone, L. Smithee, E. Zell, R. Moore, B. Cauthen

**Background:** In the U.S., 40,000 persons annually develop invasive pneumococcal disease (IPD); 4,000 of those cases are fatal. Incidence of IPD declined after 2000 following introduction of a pediatric pneumococcal conjugate vaccine (PCV7), which prevents infections caused by 7 pneumococcal serotypes. Because Oklahoma had low coverage with PCV7, the Oklahoma State Department of Health (OSDH) assessed whether passive surveillance for IPD could estimate the burden of vaccine-preventable IPD.

**Methods:** We evaluated the sensitivity of passive IPD reporting during 2003-2005 by projecting IPD rates from an active, population-based surveillance program (Active Bacterial Core surveillance, ABCs) used in ten states to the Oklahoma population. We compared these projections to rates calculated from passive reporting, adjusting for underreporting estimated from a 2003 laboratory audit conducted by OSDH. We compared proportions of cases hospitalized to evaluate the representativeness of passive IPD reporting.

**Results:** The overall rate of IPD reported by OSDH's passive surveillance was greater than what was predicted from ABCs (20 vs. 13 cases per 100,000,  $p < 0.001$ ), while rates among children aged  $< 5$  years were similar (20 vs. 22 cases per 100,000). Among whites, the projected rate was lower than the observed rate while the reverse was true among blacks. Based on the laboratory audit, 30% of IPD cases may not be reported. The proportion of IPD cases hospitalized among children aged  $< 5$  years in Oklahoma varied from 56-69%, while in ABCs this proportion varied from 44-49%.

**Conclusion:** Passive surveillance in Oklahoma is effective in detecting cases of IPD. However, it may not be sufficiently representative to provide accurate estimates of the vaccine-preventable burden of IPD, especially because less severe cases and cases among blacks may be underreported.

**Keywords:** surveillance, vaccine-preventable, invasive pneumococcal disease

Monday, April 16, 2007  
Session C: Mass Consumption — Tuberculosis  
Grand Ballroom  
1:30–3:00 p.m.  
Moderator: Philip LoBue

1:35 p.m.

### Investigation of *Mycobacterium tuberculosis* Transmission Among Sailors Aboard USS Ronald Reagan — California, 2006

**Authors:** Ann M. Buff, S. Deshpande, T. Wofford, T. O'Hara, K. Carrigan, N. Martin, J. McDowell, T. Harrington, L. Lambert, J. Oeltmann, K. Ijaz

**Background:** Historically, extensive transmission of *Mycobacterium tuberculosis* occurred on U.S. Navy ships. In July 2006, a sailor aboard USS Ronald Reagan was diagnosed with smear-positive, cavitary, pulmonary tuberculosis (TB). While he was contagious, 4,980 sailors and 1,225 civilians were aboard. In collaboration with the U.S. Navy, we investigated transmission of *M. tuberculosis* among sailors to determine a civilian TB screening strategy.

**Methods:** We screened all sailors, assessed the ship's environment, and conducted a case-control study to determine factors associated with a new positive tuberculin skin test (TST) result. Case-sailors were aboard ship during January–July 2006 and had a new positive TST result ( $\geq 5$  mm). Randomly selected control-sailors were aboard ship during the same time and had a negative TST result ( $< 5$  mm). Logistic regression modeling generated adjusted odds ratios (AOR) for associations between predictor variables and a new positive TST result.

**Results:** We identified no secondary TB disease. The patient slept in a compartment with air wing sailors; his bunk was 18 feet from an air intake that exhausted directly overboard. One hundred thirty-four (2.7%) sailors had new positive TST results. Seventy-five percent (92/123) of case-sailors and 69% (549/800) of control-sailors completed study questionnaires. Being born outside the United States (AOR=2.8, 95% Confidence Interval [CI]=1.6–5.1) and being a member of the air wing (AOR=2.9, 95% CI=1.8–4.6) were associated with a new positive TST result.

**Conclusion:** *M. tuberculosis* transmission was minimal ( $< 3\%$ ) among sailors. Investigation results guided the strategy to screen 38 civilians who slept in the patient's berthing compartment, which saved resources by eliminating unnecessary testing and potential treatment of 1,187 civilians. This response demonstrated the importance of cooperation among federal agencies.

**Keywords:** pulmonary tuberculosis, *Mycobacterium tuberculosis*, tuberculin test, disease transmission, epidemiology, military personnel

1:55 p.m.

**Sub-Therapeutic Serum Concentrations of Anti-Tuberculosis Medications and Treatment Outcome — Botswana, 1997–1999**

**Authors:** Sekai R. Chideya, J. Tappero, C. Peloquin, C. Winston, C.D. Wells

**Background:** Worldwide, tuberculosis (TB) remains a leading infectious cause of mortality. Sub-therapeutic concentrations of anti-tuberculosis medications (ATMs) occur frequently among HIV-infected persons, and may be associated with poor treatment response and TB drug-resistance development. To determine potential associations between ATM concentrations and clinical outcomes we evaluated these factors among TB patients in Gaborone, Botswana.

**Methods:** From 1997 through 1999 all consenting adult TB patients at Gaborone’s largest public outpatient clinic had serum drawn at 1, 2, and 6 hours after initial isoniazid, rifampin, ethambutol and pyrazinamide dosing. Patients’ clinical statuses were then monitored for 18 months after ATM initiation. Serum ATM concentrations were determined using high performance liquid chromatography, designated as “normal” or “low” using established definitions, and analyzed against poor outcome (defined as treatment failure or death during TB treatment).

**Results:** Overall, 179 patients had pharmacokinetic panels; 33 (18%) had poor outcomes of which 27 (82%) were HIV-infected. The median CD4+ lymphocyte cell count for HIV-infected patients was 191 cells/ $\mu$ L (range: 2-888); none were taking antiretroviral therapy. Low isoniazid concentrations occurred in 59 (33%); rifampin in 153 (86%); ethambutol in 67 (38%); and pyrazinamide in 6 (3%) of the 179 patients. No significant association existed between ATM concentrations and treatment outcome among HIV-uninfected persons; however among HIV-infected persons having either CD4 count <200 (relative risk [RR]: 2.32, 95% confidence interval [CI] =1.06–5.09,  $p$ <.03) or low pyrazinamide (RR: 3.83, 95% CI=2.17–6.76,  $p$ <.02) was associated with poor outcome.

**Conclusion:** In this study TB patients having low pyrazinamide levels or advanced immunosuppression experienced poor treatment outcomes. Further investigation of pharmacokinetic abnormalities and possible links to TB treatment outcomes and drug-resistance in this population is needed.

**Keywords:** tuberculosis, HIV/AIDS, pharmacokinetics, treatment failure, death

2:15 p.m.

**An Investigation of Workplace Contacts of a Highly Contagious Tuberculosis Case-Patient — Maryland, Washington, DC, and Virginia, 2006**

**Authors:** Gita G. Mirchandani, M. Miner, D. Blythe, M. Davenport, W. Cronin

**Background:** In May 2006, the Maryland Department of Health and Mental Hygiene (DHMH) was notified of a highly contagious pulmonary tuberculosis (TB) case in a U.S.-born, 46 year-old, white male. Since the patient’s job as an office furniture installer involved close contact with coworkers, including travel in vans to jobsites, the workplace became the focus of this investigation. We conducted a contact investigation to control transmission of TB infection and prevent future TB disease.

**Methods:** We reviewed a list of 500 employees and identified 79 coworkers potentially exposed during the 15-month infectious period from February 1, 2005–April 20, 2006. Tuberculin skin tests (TSTs) were conducted. Second-round TSTs were conducted for TST-negative contacts with recent exposure. A high rate of infection among high-risk, van-riding coworkers led to expansion of the investigation to low-risk contacts with minimal exposure at 37 worksites in Maryland, Washington, DC, and Virginia. DHMH developed worksite assessment tools and coordinated telephone and electronic-mail communication across jurisdictions.

**Results:** TST positivity was 39% (21/54) among van-riding coworkers, including six (29%) whose skin test status changed from negative to positive 8-10 weeks after the first TST. Sixty-two percent (13/21) are on treatment for latent tuberculosis infection (TLTBI). The expanded investigation at 37 jobsites revealed a 15% (21/143) TST positivity rate, with rates of 12%, 21%, and 28% in Virginia, Maryland, and Washington, DC, respectively. Thirty-three percent (7/21) are on TLTBI. No cases of active tuberculosis disease were identified.

**Conclusion:** Prolonged infectiousness of the patient contributed to high transmission rates. Change in TST status among 29% of those infected confirms recent transmission. Workplace-based contact investigations can be effective for rapidly identifying and screening contacts.

**Keywords:** pulmonary tuberculosis, contact investigations, occupational health, latent tuberculosis infection

2:35 p.m.

**Mobility and Lack of Observed Therapy as Risk Factors for Unsuccessful Tuberculosis Treatment Outcome Among Non-Thais in Thailand, 2004–2005**

**Authors:** Bryan K Kapella, A. Anuwatnonthakate, S. Komsakorn, N. Yamada, P. Charusuntonsri, W. Sattayawuthipong, W. Wattanaamornkiat, S. Nateniyom, D. Wiriyakitjar, C.D. Wells, J.K. Varma

**Background:** Thailand ranks among the top 22 countries for tuberculosis (TB) disease burden. While the adoption of observed therapy as part of TB treatment has improved treatment outcomes for Thai nationals, data about TB disease and treatment outcomes in non-Thais, including migrants, are not routinely collected.

**Methods:** During 10/2004 – 9/2005, we interviewed all persons treated for TB in four Thai provinces. We classified persons as non-Thai if they did not possess a Thai national identification card. Standard TB program evaluation definitions were used; successful treatment was defined as cured or completed treatment, and unsuccessful treatment as death, default, or failure. We performed multivariable logistic regression to identify characteristics associated with unsuccessful treatment.

**Results:** Of 4,530 TB patients with documented treatment outcomes, 380 (8%) were non-Thai. Treatment was unsuccessful in 1,074 (26%) of 4,150 Thais compared with 164 (43%) of 380 non-Thais ( $p < 0.01$ ). Of non-Thai TB patients defined as having unsuccessful treatment outcomes, 87% defaulted. After the data were controlled for known predictors of treatment outcome, including HIV status, non-Thai status was significantly associated with unsuccessful treatment (adjusted Odds Ratio [aOR] 2.58; 95% Confidence Interval [CI] 1.94–3.43). Among non-Thais, unsuccessful treatment was associated with mobility (66% had recently moved to a new Thai province) (aOR 3.45; CI, 2.03–5.87) and lack of observed therapy (78% did not receive observed therapy) [aOR 1.96; CI, 1.04–3.67].

**Conclusion:** TB treatment outcomes in non-Thais, particularly in mobile populations, are significantly worse than in Thai patients. Improved efforts to deliver observed therapy to non-Thai patients and creative programs to ensure effective treatment for mobile populations are essential to national and global TB control.

**Keywords:** tuberculosis, Thailand, migrant, outcome

Monday, April 16, 2007  
Session D: Your Mother  
Was Wrong — Do Not Eat Your Veggies;  
Foodborne Disease  
Grand Ballroom, 3:15–5:20 p.m.  
Moderator: Donald Sharp

3:20 p.m.

**Outbreak of *Escherichia coli* O157:H7 Infections Associated with Lettuce at a Fast-Food Chain Restaurant — Minnesota, 2006**

**Authors:** Stacy M. Holzbauer, B. Miller, S. Husain, J. Scheftel, L. Gabriel, S. Brend, C. Olson, K. Elfering, K. Smith

**Background:** *Escherichia coli* O157:H7 causes an estimated 73,000 infections and 61 deaths in the United States annually. Reported produce-associated *E. coli* O157:H7 outbreaks are increasing. On December 10, 2006, the Minnesota Department of Health received multiple reports of patients with bloody diarrhea in southern Minnesota; three were positive for *E. coli* O157:H7. Initial interviews with five patients revealed that all had eaten at one of two Mexican fast-food (Chain X) restaurants in southern Minnesota. An *E. coli* O157:H7 outbreak potentially associated with Chain X was concurrently occurring in Iowa.

**Methods:** Case finding was enhanced by issuing a press release and health alert. A case-control study was conducted among patrons at the two implicated restaurants. Cases were defined as bloody diarrhea occurring during November 24–December 15, 2006, within one week of eating at an implicated restaurant. Case-patients' well meal companions served as control subjects.

**Results:** We identified 32 cases (median age=24.5 years; range=3–62 years). Eight (25%) case-patients were hospitalized; one experienced hemolytic uremic syndrome. Meal dates occurred during November 27–December 6, 2006. Ten culture-confirmed cases were indistinguishable by pulsed-field gel electrophoresis. Thirty-one of 32 case-patients had consumed shredded lettuce versus 9/21 control subjects (odds ratio=41.3, 95% confidence interval=4.7–362.3). No other ingredients were associated with illness. The same delivery truck had brought shredded iceberg lettuce to Chain X outbreak restaurants in Minnesota and Iowa. The lettuce was traced to California.

**Conclusion:** This *E. coli* O157:H7 outbreak was associated with lettuce consumption at Chain X. The outbreak strain was subsequently isolated from a dairy farm adjacent to a lettuce growing area in California. Agricultural practices are being evaluated for potential mechanisms of contamination.

**Keywords:** *Escherichia coli* O157:H7, lettuce, hemolytic uremic syndrome, outbreak

3:40 p.m.

**Recurrent Outbreak of *Salmonella* Newport Infections Associated with Tomatoes — Eastern and Central United States, July–October 2006**

**Authors:** Christine K. Olson, R. Rickert, P. Yu, M. Iwamoto, S. Greene, T. Taylor, N. Patel, C. Braden, S. Muqueeth, M. Lynch, *Salmonella* Newport Outbreak Working Group

**Background:** *Salmonella* is a common cause of foodborne illness, and serotype Newport is the third most common *Salmonella* serotype in the U.S. During July–September 2006, many *S.* Newport isolates with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns were identified in multiple states by PulseNet, a national bacterial subtyping network. These isolates matched a rare pattern identified in outbreaks in 2002 and 2005 associated with tomatoes from Virginia.

**Methods:** We conducted a matched case-control study, defining a case as diarrheal illness in a patient aged 18–75 years with onset July 17 to October 17, 2006, with a *S.* Newport isolate matching the outbreak strain. Two well-neighbor controls were identified per case using reverse telephone directories. Food histories were obtained for seven days before the matching case-patient's illness.

**Results:** We enrolled 24 case-patients and 41 matched controls from nine states. Eating raw tomatoes in restaurants was the only risk factor significantly associated with illness (matched odds ratio 4.9, confidence interval 1.02–23.26). No common restaurant was associated with illness. Because this particular strain was traced twice before to the same growing region in Virginia, an environmental study of this region is planned by the U.S. Food and Drug Administration for the 2007 growing season.

**Conclusion:** Restaurant tomatoes were the likely food vehicle responsible for this outbreak. This is the third large multi-state outbreak of this *S.* Newport strain associated with tomatoes, indicating an ongoing threat. The outbreak strain has persisted over at least four years, suggesting a stable, environmental reservoir in growing fields or production facilities. Efforts to understand these reservoirs and routes of contamination are needed to guide prevention strategies.

**Keywords:** *Salmonella*, food contamination, pulsed-field gel electrophoresis, diarrhea, disease outbreaks

4:00 p.m.

**Deaths Due to Bacterial Pathogens Commonly Transmitted Through Food in the Foodborne Diseases Active Surveillance Network (FoodNet), 1996–2005**

**Authors:** Casey Barton Behravesh, O. Henao, C. Long, D. Vugia, R. Marcus, S. Thomas, E. Swanson, B. Anderson, T. Jones, E. Scallan, and FoodNet Working Group

**Background:** *Salmonella* and *Listeria* are the leading causes of death due to known foodborne pathogens. We reviewed data from the Foodborne Diseases Active Surveillance Network (FoodNet) to describe the epidemiology of deaths due to bacterial foodborne pathogens.

**Methods:** FoodNet conducts population-based, active surveillance for laboratory-confirmed infections due to foodborne pathogens at >650 clinical laboratories serving 10 sites (44 million persons; 15% of the U.S. population). Information on outcome seven days after laboratory-confirmation was ascertained for all cases during 1996–2005.

**Results:** FoodNet ascertained 122,104 cases of laboratory-confirmed bacterial infections including 558 (0.5%) deaths (0.2 deaths/100,000 population), of which 215 (36%) were associated with *Salmonella* and 173 (29%) with *Listeria*. When compared with persons <65 years old, persons ≥65 years accounted for 55% (n=326) of deaths (p<0.001), but only 8.5% (n=8,524) of cases. Most deaths due to *Salmonella* (59%) and *Listeria* (73%) occurred in persons ≥65 years old. Of laboratory-confirmed infections, *Listeria* had the highest case fatality rate (CFR) (16.9%) followed by *Vibrio* (7.3%), *Escherichia coli* O157 (0.9%), *Salmonella* (0.6%), *Campylobacter* (0.15%), and *Shigella* (0.13%). Although there were significant decreases in the incidence of certain laboratory-confirmed infections during 1996–2005, including *Salmonella* and *Listeria*, CFRs did not change.

**Conclusion:** *Salmonella* and *Listeria* remain the leading causes of death due to bacterial foodborne pathogens. *Salmonella* causes the largest number of deaths but has a low CFR relative to *Listeria*, a low-incidence pathogen. This highlights the importance of including information on deaths when determining the impact of specific foodborne pathogens. Significantly more deaths occurred in persons ≥65 years old, which may be due to age-related comorbidities. This suggests the need for food safety interventions to protect this high-risk group.

**Keywords:** enteric bacteria, food, death, surveillance, case fatality rate

4:20 p.m.

#### Outbreak of *Salmonella* serotype Thompson Associated with Boiled Peanuts — South Carolina, 2006

**Authors:** Kira A. Christian, J. Schlegel, L. Ard, E. Mays, P. Curry, M. Davis

**Background:** In 2005, there were 45,425 cases of salmonellosis in the United States. On October 20, 2006 the South Carolina Department of Health and Environmental Control was notified of multiple *Salmonella* infections among persons who attended the Pumpkin Festival in Pumpkintown, South Carolina on October 14, 2006. We investigated this outbreak to determine the source of infection and to prevent future illness.

**Methods:** We conducted a case-control study. A case was defined as diarrhea with or without vomiting, abdominal cramps, or nausea in a Festival visitor within 72 hours of visiting the Festival; confirmation was by isolation of *Salmonella* from stool. Controls included well persons, identified by case-patients, who had visited the Festival. *Salmonella* isolates from stool and food specimens were typed by pulsed-field gel electrophoresis (PFGE). We surveyed case-patients, controls, and food vendors about various environmental exposures and food items.

**Results:** Twenty-three cases were identified; ages ranged from 1 to 77 years. Boiled peanuts were consumed by 22/23 case-patients and 10/23 controls (odds ratio=28.6; 95% confidence interval=3.1–670.6). Cultures of ten stool samples submitted by case-patients and one sample of boiled peanuts yielded *Salmonella* serotype Thompson; PFGE patterns were indistinguishable. The peanut vendors were not ill and vendor stool specimens were negative for *Salmonella*. Incorrect vendor food-handling practices included improper temperature control and possible serving-ladle contamination. No associations were identified with other foods or environmental exposures.

**Conclusion:** This *Salmonella* outbreak was the first in the United States associated with boiled peanuts. Although the peanuts are boiled and salted, contamination is possible after processing. Clinicians and food vendors should be aware that any food can be a source of illness if improper food handling occurs.

**Keywords:** *Salmonella*, food poisoning, gastroenteritis, disease outbreaks, electrophoresis, gel, pulsed-field

4:40 p.m.

#### Campylobacteriosis Outbreak Associated with Pasteurized Milk — California, May 2006

**Authors:** Jean W. Yuan, M.T. Jay, P. Barry, J. Schneider, S. Beam, R. Kanan, R. Mandrell, W. Miller, D Winslow, J. Mohle-Boetani

**Background:** *Campylobacter* is a common bacterial cause of diarrheal illness in the United States. We investigated a large campylobacteriosis outbreak in multiple facilities, including a prison with an onsite dairy (Prison A), to determine risk factors, identify contamination sources, and prevent further illness.

**Methods:** We conducted a cohort study among 260 Prison A inmates. We defined a case as diarrheal illness or culture-confirmed *Campylobacter jejuni* infection during May 2006. We issued a quarantine notice of Prison A dairy products, conducted case-finding statewide, tested milk samples, and conducted an environmental investigation of the dairy farm. We rapidly screened for the outbreak strain in environmental samples with a novel DNA sequence-based assay that detects hypervariable regions of the *C. jejuni* major outer membrane protein (MOMP).

**Results:** Inmates who reported having drunk milk were more likely to experience diarrhea than those who had not drunk milk (33% versus 3%; risk ratio=11.7; 95% confidence interval=1.7–81.8). We identified 1,592 possible and 52 culture-confirmed *C. jejuni* infections from 11 facilities statewide that received milk from the dairy. Approximately 2,900 cases of milk were returned. No global breach in pasteurization was identified, yet milk samples produced before the outbreak contained high levels of bacteria, with standard plate counts >100,000/mL (acceptable level=<15,000/mL). We isolated ~100 *C. jejuni* strains from farm samples; three isolates from flush-alley water match the human strain by MOMP screening, multilocus sequence typing, and pulsed-field gel electrophoresis.

**Conclusion:** This is the largest *campylobacteriosis* outbreak associated with pasteurized milk in the United States; prompt public health action likely prevented further infections. The *C. jejuni* MOMP gene is a promising target for rapid environmental screening in *Campylobacter* outbreaks.

**Keywords:** *Campylobacter* infections, milk, outbreaks, prisons, diarrhea, major outer membrane protein

5:00 p.m.

**Passenger Knowledge, Attitudes, and Practices During Cruise Ship Outbreaks Caused by Norovirus**

**Authors:** Antonio J. Neri, E. Cramer; H. Mainzer, A. Dannenberg, G. Vaughan, J. Vinjé, C. O'Reilly, A. Karon

**Background:** Between 2001 and 2004, norovirus caused 48 of 86 cruise ship outbreaks in the U.S. These outbreaks are primarily propagated person-to-person and are difficult to control. Hand washing, isolation, contact precautions, and rigorous environmental decontamination have been somewhat successful in controlling norovirus outbreaks. Little is known about the knowledge, attitudes, and practices of the average 13,738 people who become ill on cruise ships annually.

**Methods:** Between January and November 2006, passenger surveys were administered during five cruise ship outbreaks caused by norovirus: individual studies compared 572 patients with 2374 persons who were not ill. Univariate odds ratios were used to evaluate ship-board dining practices and environmental exposures. Non-parametric tests were used to evaluate hygienic beliefs and practices.

**Results:** People who were ill did not use any dining location more frequently than those who did not become ill. Ill persons were significantly less likely to a) believe that hand washing (P 0.002), hand sanitizer (P 0.04), or isolation (P <0.001) were effective in preventing the spread of pathogens that cause gastrointestinal illness; b) practice hand washing after using the restroom (P 0.02); c) know that hand sanitizer was available before learning that an outbreak was occurring (P 0.002).

**Conclusion:** These findings offer insight into the possible underlying reasons for disease transmission during norovirus outbreaks. Persons who became ill were significantly less likely to believe in the efficacy of actions known to prevent the spread of norovirus gastrointestinal illness. Outbreak prevention and response plans need to address these underlying beliefs and provide the appropriate facilities to control the introduction and spread of norovirus disease on cruise ships.

**Tuesday, April 17, 2007**  
**Concurrent Session E1: Transmission, Testing, and Treatment — HIV**  
**Grand Ballroom**  
**8:30–10:15 a.m.**  
**Moderator: Linda Valleroy**

8:35 a.m.

**Renal Function Improves Among HIV-Infected People on Highly Active Antiretroviral Therapy — Uganda, 2003–2006**

**Authors:** Philip J. Peters, D. Moore, J. Mermin, J. Brooks, R. Downing, W. Were, A. Kigozi, K. Buchacz, P. Weidle

**Background:** Although renal dysfunction is a common life-threatening complication of advanced HIV disease in African Americans, little is known about its impact in Africa, where an estimated 25 million people are living with HIV/AIDS. We evaluated the impact of antiretroviral therapy (ART) on renal function in the Home-Based AIDS Care program in rural Uganda.

**Methods:** From May 2003 to December 2004, we initiated ART for 1029 antiretroviral-naive patients with symptomatic HIV disease or CD4 cell count  $\leq 250$  cells/mm<sup>3</sup> and estimated creatinine clearance  $>25$ ml/min. We analyzed serum specimens for creatinine from a subset of 507 patients whose specimens were available from baseline and month 24. The Wilcoxon rank-sum and chi-square tests were used to evaluate changes in creatinine and to compare rates of moderate renal dysfunction (creatinine  $\geq 1.50$ mg/dL).

**Results:** Patients (59% women, median age 39 years, median CD4 cell count 122 cells/mm<sup>3</sup>) received stavudine plus lamivudine with nevirapine (n=495) or efavirenz (n=12). Baseline median creatinine was 1.10mg/dL and 54 (11%) of 507 patients had a creatinine  $\geq 1.50$ mg/dL. Characteristics associated with moderate renal dysfunction at baseline were age  $\geq 45$  years (p=0.01) and male sex (p=0.0001), but not CD4 cell count or viral load. At 24 months, median creatinine was 0.92mg/dL (16% decline, p<0.0001) and was  $\geq 1.5$ mg/dL for 13 (3%) of 507 (p<0.0002 vs baseline). Among patients with creatinine  $\geq 1.5$ mg/dL at baseline, creatinine improved from a median of 1.60mg/dL to 1.05mg/dL at 24 months (39% decrease, p<0.0001).

**Conclusion:** Moderate renal dysfunction was common in this population with advanced HIV disease in rural Uganda and improved over 2 years on ART. Clinicians should recognize that renal function may normalize on ART in many patients with moderate renal dysfunction.

**Keywords:** highly active antiretroviral therapy, renal insufficiency, africa, AIDS-associated nephropathy

**8:55 a.m.**

**Population Prevalence of Diagnosed and Undiagnosed HIV and Associated High-Risk Behaviors Among New York City Adults — New York City, 2004**

**Authors:** Trang Q. Nguyen, R.C. Gwynn, S.E. Kellerman, E. Begier, R. Garg, M. Pfeiffer, K. Konty, L. Torian, T.R. Frieden, L.E. Thorpe

**Background:** Approximately 25% of United States persons living with human immunodeficiency virus (HIV) are unaware of their infection. This study estimates prevalence of diagnosed and undiagnosed/unreported HIV infection in New York City (NYC) and compares risk behaviors between NYC's infected and noninfected adults.

**Methods:** The population-based NYC Health and Nutrition Examination Survey (HANES) was conducted in 2004 among noninstitutionalized adults aged  $\geq 20$  years. To identify previously reported HIV infection, we cross-matched NYCHANES with NYC's HIV/acquired immunodeficiency syndrome (AIDS) Registry System (HARS) of all persons with reported HIV infection, using name and date of birth. With consent, 1,626 interviewed participants' archived blood was HIV-tested anonymously. Weighted analyses accounted for complex sampling, nonparticipation and poststratification.

**Results:** HIV prevalence among NYC adults was 1.4% ( $n = 21$ ; 95% confidence interval (CI)=0.6–2.2). Five percent (95% CI=0.7–29.9) of HIV-infected adults were not reported in HARS. High-risk activities among HIV-infected adults, including having multiple sex partners (26%) and inconsistent condom use (33%), did not differ significantly from those of noninfected adults. Certain (15%; 95% CI=5.1–35.1) NYC adults identified as HIV-infected through the NYC HANES serosurvey, including the undiagnosed, reported minimal risk for currently having HIV or other sexually transmitted diseases.

**Conclusion:** Fewer HIV-infected adults in NYC's adult population had been undiagnosed/unreported than previously estimated, although excluding institutionalized and homeless persons limits analyses. Ongoing risky behaviors and perceptions of low risk among HIV-infected persons, including the undiagnosed/unreported, highlight limitations of risk-based testing and indicate that more effective prevention interventions are needed, particularly for persons who are HIV-positive. Broader, routine screening will enable identification of HIV-infected persons not targeted for testing or who do not believe they are at risk.

**Keywords:** New York City, risk, HIV epidemiology, HIV prevention and control, population surveillance, public health practice and standards

**9:15 a.m.**

**Rapid HIV Testing in Outreach and Community Settings**

**Authors:** Eric W. Tai, K. Jafa, J. Heffelfinger, H. Clark

**Background:** Of an estimated 1.1 million HIV-infected persons in the United States, 25% may be unaware of their infection. This percentage is higher among minority and high-risk subpopulations. We evaluated a rapid HIV testing demonstration project focusing on these groups.

**Methods:** During 2004–2006, eight community-based organizations in seven US cities provided rapid HIV testing in outreach and community settings. Staff collected data on clients' demographics, risk behaviors and testing history and linked newly-diagnosed HIV-infected persons to medical care. We conducted descriptive analyses to characterize clients tested and referred to care.

**Results:** Of 20,329 clients tested, the median age was 32 years; 40% were non-Hispanic Black, 21% non-Hispanic White, 30% Hispanic, and 63% male. Fifteen percent of clients identified as homosexual/gay/lesbian, 6% injected drugs in the past year, and 5% had a known HIV-infected sex partner. Thirty percent of clients had never been tested for HIV and 43% had not received an HIV test in the past year. All 267 (1%) clients with positive rapid HIV tests received rapid test results, and 223 (84%) agreed to confirmatory testing, of whom 202 (91%) were positive. A total of 147 (73%) of persons with confirmed HIV infection received their test results of whom 111 (76%) accepted referral to medical care.

**Conclusion:** Rapid HIV testing in non-traditional settings is feasible for testing minorities and high-risk subpopulations. Strategies to increase the receipt of confirmatory test results and linkage to care include initiating follow-up and care at the time of a positive preliminary test rather than after the confirmatory results are available; and, although not currently available, using sequential rapid HIV tests for immediate confirmation of a preliminary HIV diagnosis.

**Keywords:** HIV, HIV serostatus, health services accessibility, delivery of health care

**9:35 a.m.**

**HIV Seroprevalence Among Street Youth — St. Petersburg, Russia, 2006**

**Authors:** Lauren B. Zapata, D. Kissin, R. Yorick, E. Vinogradova, G. Volkova, E. Cherkasova, A. Lynch, J. Leigh, D. Jamieson, P. Marchbanks, S. Hillis

**Background:** Russia has the largest HIV epidemic in Eastern Europe and Central Asia. Individuals aged <30 years make up 80% of reported infections. Street youth, or young people living part or full time on the street, are particularly at risk for HIV. Identifying risk factors could help in tailoring HIV intervention and prevention efforts.

**Methods:** A cross-sectional assessment conducted in St. Petersburg during January-May 2006 included city-wide mapping of 41 locations where street youth congregated, random selection of 22 study sites, rapid HIV testing for consenting street youth aged 15-19 years, and an interviewer-administered survey. Adjusted odds ratios (AORs) were calculated using logistic regression that accounted for intra-cluster homogeneity.

**Results:** Most (92%) eligible youth consented to participate. Of 313 participants, 117 (37.4%) were HIV-infected. Subgroups with seroprevalences >60% included orphans (64.3%), those with no place to live (68.1%), those with prior sexually transmitted infection (STI) diagnosis (70.5%), and those currently sharing needles (86.4%), using injection drugs (78.6%), stadol (82.3%), heroin (78.1%), or inhalants (60.5%). Characteristics independently associated with HIV infection included injection drug use (AOR=23.0; 95% confidence interval [CI]=12.6-42.2), sharing needles (AOR=13.3; 95% CI=6.2-28.7), being an orphan (AOR=3.3; 95% CI=2.0-5.7), having no place to live (AOR=2.4; 95% CI=1.4-4.1), and prior STI diagnosis (AOR=2.1; 95% CI=1.1-4.1). Most HIV-infected youth were sexually active, had multiple partners, and rarely used condoms.

**Conclusion:** Street youth aged 15-19 years in St. Petersburg have extraordinarily high HIV seroprevalence and need immediate care, including drug rehabilitation, housing, HIV treatment, vocational training, harm reduction, contraception, and social support services. These strategies are critical to improving quality of life for these street youth and curtailing the HIV epidemic in Russian youth in the future.

**Keywords:** HIV, homeless youth, substance abuse, sexual behavior, Russia

**9:55 a.m.**

**Using Antenatal Clinic HIV Surveillance To Evaluate Kenya's Prevention of Mother-to-Child HIV Transmission Programs, 2005**

**Authors:** Abhijeet Anand, O. Bolu, A. Swartzendruber, L.H. Marum, A.A. Sheikh, K. Sabin

**Background:** Of the estimated 150,000 HIV-positive children in Kenya, >90% were infected through vertical transmission. Prevention of mother-to-child HIV transmission (PMTCT) programs using single-dose nevirapine (SDNVP) can reduce HIV transmission by 41%. To receive PMTCT in antenatal clinics (ANCs) women must agree to HIV testing. In ANC HIV surveillance, blood left-over from routine pregnancy tests is tested for HIV after removing identifiers, not requiring consent and thus not biased by refusals. We examined whether HIV test results from HIV surveillance in ANCs that also had PMTCT (dual sites), could be used to determine the proportion of HIV-positive women refusing PMTCT HIV testing.

**Methods:** PMTCT HIV test acceptance was recorded on surveillance forms during the surveillance period in 43 dual sites. We calculated HIV prevalence in women accepting and women refusing PMTCT HIV testing. Logistic regression was used to determine factors associated with test refusal. The number of additional infant HIV infections that could be averted was calculated as: #HIV-positive refusers X 35% estimated HIV transmission rate X 41% SDNVP efficacy.

**Results:** Of the 13,026 ANC attendees at dual sites, 12,678 (97.3%) were offered testing. Of those offered testing, 9,690 (76.4%) accepted. HIV prevalence among acceptors (8.0%) was higher than among refusers (5.4%). Compared to acceptors, refusers were significantly ( $p<0.05$ ) more likely to be older and from certain sites. During the surveillance period, these PMTCT sites missed 162 (17.3%) of 939 HIV-positive women as they refused testing. If all refusers had received SDNVP, 23 additional HIV infections might have been prevented.

**Conclusion:** HIV surveillance can be used to estimate the proportion of HIV-positive women missed by PMTCT programs and their socio-demographic characteristics, thus improving PMTCT programs.

**Keywords:** sentinel surveillance, HIV, vertical transmission, Kenya

**Tuesday, April 17, 2007**  
**Concurrent Session E2: Another Inconvenient Truth**  
**— Heat, Hurricanes, and Health Disparities;**  
**Environmental**  
**Habersham Room 8:30–10:15 a.m.**  
**Moderator: Tom Sinks**

**8:35 a.m.**

**Cholera, Crabs, and Katrina: Is Cholera Increasing in Southern Louisiana?**

**Authors:** Joan M. Brunkard, P.A. Yu, E.D. Mintz, A.E. Thomas, P. Cuneo, S. Clement, D. Bensyl, S. Straif-Bourgeois, R. Ratard

**Background:** Although cholera kills thousands each year globally, locally acquired cases are rare in the United States, and most often associated with Gulf Coast seafood. Toxigenic *Vibrio cholerae* O1, the agent of cholera, is endemic in the brackish waters of southern Louisiana. In the year since Hurricane Katrina, six cholera cases have been reported, representing a 10-fold increase over the previous 5-year baseline (2000–2004). We conducted an investigation to identify epidemiologic and environmental risk factors.

**Methods:** We interviewed the six post-Katrina case-patients and compared their exposures and isolates with previous Louisiana cholera patients. We interviewed crab wholesalers and fishermen to determine if a common environmental source of implicated seafood existed.

**Results:** Post-Katrina isolates were indistinguishable by pulsed-field gel electrophoresis (PFGE) from the Gulf Coast strain. All six patients had handled and eaten locally caught crabs within 5 days of illness onset; three had also eaten shrimp. Patients reported cooking seafood for a sufficient period to kill the bacteria, but cross-contamination was possible in five cases. Exposure information was available on 36/48 Louisiana cholera cases during 1978–2004. Crab had been consumed by 33 patients (92%) before illness; other potential vehicles included shrimp (47%), oysters (11%), and crawfish (8%). Fishermen and crab wholesalers reported that since Hurricane Katrina, crabs were being caught in areas they had never been found before the storm.

**Conclusion:** Crab continues to be the main source of cholera infection in southern Louisiana, underscoring the need for education regarding safe seafood handling and cooking practices. In addition, ecological changes post-Katrina might have altered crab habitat in southern Louisiana, emphasizing the need for enhanced surveillance to monitor cholera incidence during the 2007 season.

**Keywords:** cholera, toxigenic *Vibrio cholerae* O1, crabs, Hurricane Katrina, Gulf Coast

**8:55 a.m.**

**Racial and Ethnic Disparities in Asthma Treatment — National Asthma Survey, 2003**

**Authors:** Deidre D. Crocker, R. Moolenaar, C. Brown, F. Holguin

**Background:** Asthma affects an estimated 6 million children in the United States causing over 700,000 hospitalizations each year, with minorities bearing a disproportionate burden of asthma morbidity. Inhaled corticosteroids (ICS) are the preferred treatment for persistent asthma due to their proven ability to reduce asthma exacerbations. Since underuse of ICS may contribute to disparities in asthma morbidity, we analyzed data from the National Asthma Survey (NAS) to assess if prevalence of ICS use varies across racial and ethnic groups in children with persistent asthma.

**Methods:** We used data from the 2003 Four-State Sample of NAS (a representative asthma survey conducted in Alabama, California, Illinois, and Texas) to assess use of ICS in the past 3 months among white, black, and Hispanic children <18 years old with persistent asthma (defined as over two symptom-days per week or over two symptom-nights per month). Logistic regression models generated adjusted odds ratios (AORs) controlling for multiple confounders including symptom severity.

**Results:** Of 418 children in the response group, 45% were white, 26% were black, and 29% were Hispanic. Significantly fewer black and Hispanic children used ICS (29% and 33% respectively) than did white children (50%;  $p < 0.02$ ). In multivariate analysis, blacks (AOR=0.29, 95% CI=0.11-0.75) and Hispanics (AOR=0.40, 95% CI=0.18-0.90) were still less likely to use ICS compared to whites.

**Conclusion:** Overall, children with persistent asthma in this survey had dramatic underuse of ICS. Black and Hispanic children with persistent asthma were less likely to use ICS compared to whites, even after adjusting for symptom severity and other sociodemographic factors. Interventions to increase overall ICS use and specific programs targeting minorities may improve asthma morbidity and reduce asthma disparities in children.

**Keywords:** asthma, children, race/ethnicity, inhaled steroids, disparities

**9:15 a.m.**

**Health Effects of Exposure to Water-Damaged Homes Six Months After Hurricane Katrina — New Orleans, Louisiana, March 2006**

**Authors:** Kristin J. Cummings, J. Cox-Ganser, M. Riggs, N. Edwards, G. Hobbs, K. Kreiss

**Background:** Following Hurricane Katrina (August 2005), 110,000 water-damaged homes in New Orleans had visible mold growth. We surveyed residents to investigate the respiratory health effects of exposure to water-damaged homes and the impact of using recommended respirators during clean-up.

**Methods:** In March 2006, we randomly selected 600 residential sites using geographic information system software, interviewing one adult per site about post-Katrina clean-up activities, respirator use, and respiratory symptoms. We created: an exposure variable incorporating being inside a water-damaged home, number of homes cleaned, and self-reported mold extent; symptom scores based on symptom grade; and symptom exacerbation categories reflecting the effect of being inside water-damaged homes. We used multivariable linear regression to investigate factors associated with symptom scores and multivariable polytomous logistic regression to investigate factors associated with inside symptom exacerbation among those reporting clean-up activities.

**Results:** Of 553 participants (response rate=92%), 372 (68%) had participated in clean-up; 233 (63%) of these used a respirator. Among all participants, 360 (65%) reported  $\geq 1$  upper respiratory symptom and 245 (44%)  $\geq 1$  lower respiratory symptom. Exposure was associated with overall, upper, and lower respiratory symptoms (all p-values $<0.0001$ ). The mean overall symptom score was 2.7 for participants who had not been inside a water-damaged home and 4.8 for participants in the highest exposure category (p-value $<0.01$  for linearity). Respirator use during clean-up had a lower odds of inside exacerbation of lower respiratory symptoms than no use (mild: OR=0.42; 95% CI=0.18-0.97; moderate/severe: OR=0.47; 95% CI=0.22-0.98).

**Conclusion:** In the six months post-Katrina, upper and lower respiratory symptoms were common among New Orleans residents and positively associated with exposure to water-damaged homes. Respirator use during clean-up had a protective effect against lower respiratory symptoms.

**Keywords:** flood, mold, respiratory symptoms, respirator

**9:35 a.m.**

**Heat-Related Deaths Associated with a Severe Heat Wave — California, July 2006**

**Authors:** Thomas J. Kim, R. Trent, G. Windham

**Background:** As a major cause of weather-related death in the United States, excessive heat caused approximately 3,400 deaths during 1999–2003. The July 15–31, 2006, California heat wave, which broke records in daily temperature and consecutive number of days  $>38^{\circ}\text{C}$  ( $100^{\circ}\text{F}$ ), demonstrated this impact when 134 persons died of heat-related causes. The California Department of Health Services investigated these deaths to identify modifications in the state heat emergency plan to prevent future deaths.

**Methods:** We obtained coroner reports from all 19 counties with heat-related deaths. The case definition was hyperthermia listed by the coroner as the underlying or contributory cause of death in a California resident of any age. We abstracted demographic characteristics, details of exposure, and evidence of heat-mitigation efforts. Denominators for rates were obtained from the 2000 U.S. Census for each county. We used the Mann-Whitney test for significance in median differences.

**Results:** Of the 134 confirmed heat-related deaths (0.55 deaths/100,000 population), 56% occurred at home; 35% were among females; 18% were Hispanic; and 79% had had chronic disease, primarily cardiovascular. The median non-Hispanic age at death was 68 years (range=36–97), whereas the median Hispanic age was 54 years (range=27–98; p=0.05). Fourteen of 15 with air-conditioning did not use it. Sixty-three percent who lived alone had had social contact within 24 hours before death.

**Conclusion:** We observed a pattern of younger age among Hispanics and nonuse of functioning air-conditioners among the decedents. Deaths also occurred despite recent social contact. Among other strategies, heat-preparedness planning should include culturally appropriate outreach, targeted promotion of electricity rate-assistance programs for groups at high risk, and education for social contacts of persons at high risk.

**Keywords:** heat, hyperthermia, heat stroke/mortality, heat stress disorders, California

9:55 a.m.

**Invasive Mold Infections and Mold Exposures Among Immunocompromised Adults After Hurricane Katrina — New Orleans, 2005–2006**

**Authors:** Carol Y. Rao, J. Morgan, D. Reed, S. Kemmerly, S. Fridkin

**Background:** Under typical environments, invasive mold infections (IMI) occur in 1-2% of severely-immunocompromised persons annually. In September 2005, widespread flooding of New Orleans after Hurricane Katrina caused extensive mold contamination; airborne pathogenic molds were detected in hurricane-damaged homes. CDC recommended that immunocompromised persons avoid such buildings or use personal protective equipment (PPE). We investigated IMI incidence and mold prevention practices among a cohort of immunocompromised New Orleans residents.

**Methods:** We estimated mold exposures by determining activities and PPE used while in hurricane-damaged buildings among adult patients visiting Ochsner's Infusion, Hematology/Oncology and solid-organ transplant clinics from 2/22/2006-5/11/2006. We reviewed medical records to determine immune status (profoundly-immunocompromised, other-immunocompromised or non-immunocompromised) based on medications and underlying illness and identify IMIs that occurred within one-year post-hurricane. Case-patients were defined as immunocompromised participants with microbiological and clinical evidence compatible with IMI. We calculated risk ratios (RR) and 95% confidence intervals (95%CI) to assess effect of immunocompromised status on prevention practices.

**Results:** Among the 199 participants, profoundly-immunocompromised participants (n=84) were more likely to avoid mold exposures than other-immunocompromised (n=65) and non-immunocompromised (n=50)(RR=1.68; 95%CI=1.29-2.21). Of those reporting exposures, participants reported wearing N-95 masks <40% of the time. Profoundly-immunocompromised reported wearing N-95 respirators more often than other-immunocompromised participants (RR=1.68; 95%CI=1.29-2.21). We identified 1 IMI case-patient with *Cladosporium* (1.2% of profoundly-immunocompromised) who reported wearing N-95 respirators while cleaning hurricane-damaged buildings prior to symptom onset. The case-patient recovered without receiving treatment for IMI.

**Conclusion:** Although post-hurricane recommendations to avoid mold exposures or use PPE were not strictly followed, incidence of IMIs was not elevated among this population. This suggests that molds associated with water-damaged buildings infrequently cause infections even in susceptible populations with unprotected exposures.

**Keywords:** molds; mycoses; hurricanes; floods; environmental exposure; immunocompromised host

**Tuesday, April 17, 2007**  
**Concurrent Session F1: Out of Control —**  
**Vaccine-Preventable Disease**  
**Presentation of the Iain C. Hardy Award**  
**Grand Ballroom 10:45 a.m.–12:15 p.m.**  
**Moderator: Jane Seward**

10:50 a.m.

**Multi-State Mumps Outbreak — United States, 2006**

**Authors:** Amy A. Parker, G. Dayan, S. Goldstein, M. Marin, C. Bridges, W. Bellini, J. Rota, D. Bi, S. Redd, M. Cortese, A. Barskey, P. Quinlisk, M. Harris, K. Hunt, C. Finley, J. Hill, D. Leschinsky, J. Clayton, E. Dietle, J. Berg, J. Seward

**Background:** Mumps, an acute viral illness characterized by fever, malaise, and parotitis, may result in serious complications including meningitis, orchitis, and deafness. Two doses of mumps-containing vaccine are approximately 90% effective. Although the U.S. has high two-dose mumps vaccine coverage in children, during 2006, the largest reported mumps outbreak in more than 20 years occurred nationwide. Mumps, an acute viral illness characterized by fever, malaise, and parotitis, may result in serious complications including meningitis, orchitis, and deafness. Two doses of mumps-containing vaccine are approximately 90% effective. Although the U.S. has high two-dose mumps vaccine coverage in children, during 2006, the largest reported mumps outbreak in more than 20 years occurred nationwide.

**Methods:** Our investigation focused on describing the outbreak and determining whether new vaccination policies were needed. Descriptive epidemiology data were obtained from the National Notifiable Diseases Surveillance System. Individual databases from the seven most affected states were obtained to more accurately describe vaccination status and clinical symptoms/complications.

**Results:** From January 1 through July 31, 2006, 45 states reported 5605 mumps cases; 90.4% were non-Hispanic white and 63.9% were female. The highest incidence was in seven Midwestern states. The highest age-specific attack rate occurred in persons aged 18-24 years (5.3 per 100,000), primarily college students. In highly affected colleges, with two-dose vaccine coverage between 77%-99%, attack rates were 1%-4%. Reported complications included orchitis in 8% of post-pubertal males, and meningitis (0.5%), encephalitis (0.3%), and deafness (0.3%) in the overall population. Mumps-related hospitalizations occurred in 2% of patients.

**Conclusion:** In this outbreak, colleges with high two-dose coverage had much lower attack rates than the attack rates of 6%-18% that occurred in outbreaks in secondary schools in the 1980s with high one-dose coverage. Thus, high two-dose vaccine coverage likely limited the outbreak size.

However, the effectiveness of mumps-containing vaccine was not sufficient to prevent this outbreak. The current two-dose vaccination policy may not be adequate or a more effective vaccine may be needed to prevent and control mumps in the U.S.

**Keywords:** mumps, vaccine, outbreak, vaccine effectiveness, policy

**11:10 a.m.**  
**Measles Outbreak — Massachusetts, May–June 2006**

**Authors:** Sandra K. Schumacher, S. Lett, B. Matyas

**Background:** Endemic transmission of measles, a highly communicable viral disease, has been eliminated in the United States. However, sporadic cases and small outbreaks continue to occur due to importations. Acceptable presumptive evidence of immunity through vaccination for most US-born adults is documentation of at least one dose of measles-containing vaccine. During May–June 2006, a measles outbreak involving 17 cases among Massachusetts adults was traced to a temporary office worker from India. We investigated to characterize cases and implement control measures.

**Methods:** We reviewed case reports for all confirmed measles cases reported to the Massachusetts Department of Public Health during May 5–June 24. Confirmed case-patients met CDC's case definition, which consists of both clinical criteria and laboratory data. Case-patients' vaccination histories were analyzed.

**Results:** Most cases worked in the same building as the index case. All 18 cases had laboratory evidence for a confirmation; 11 of 18 cases also met clinical criteria. Median age was 36 years (range=23-46 years); 61% were male. Three cases had received 2 doses of vaccine, two had received 1 dose, three were unvaccinated, and ten had an unknown vaccination history. One case had been vaccinated in the mid-1960s when the vaccine was less efficacious. Ten cases had measles virus identified by polymerase chain reaction; all demonstrated the D8 (Indian) strain. As part of the control measures, ≥17,000 measles immunizations were administered.

**Conclusion:** This outbreak demonstrates that measles can be transmitted in an adult setting when the virus is introduced. Vaccination status could not be assessed in the majority of the cases. Laboratory confirmation was useful in identifying cases not meeting the clinical criteria.

**Keywords:** importation, Massachusetts, measles, vaccination

**11:30 a.m.**  
**Mumps Outbreak Among a Highly Vaccinated Population: A Case-Control Study at the University of Kansas**

**Authors:** Angela S. Huang, A. Curns, R. Bitsko, H Jordan, F. Soud, J. Villalon, P. Quinlan, K. Ens, K. Colson, J. Hill, M. Siemsen, D. C. Hunt, M. Cortese

**Background:** Mumps is the only known cause of epidemic parotitis. Incidence has declined by >99% since the live-attenuated vaccine was licensed in 1967, but outbreaks still occur. In April 2006, the University of Kansas reported the first mumps outbreak in Kansas since 1989. This school has had a two-dose measles-mumps-rubella (MMR) vaccination requirement since 1992. By May 8, 2006, 173 cases were reported among 25,379 students.

**Methods:** We conducted a case-control study to identify risk factors associated with disease. A case was defined as an undergraduate student with disease onset during January 1–May 8, 2006, who had parotitis for ≥2 days, males with orchitis, or identification of mumps virus from a clinical specimen. Controls were randomly selected from undergraduate students and denied mumps symptoms upon interview.

**Results:** For the 97 cases and 147 controls, 96% had complete immunization records. Of these, 99% of the cases and 99% of the controls had ≥2 doses of MMR vaccine. Cases were more likely to be freshmen (34% of the cases; odds ratio [OR]=3.2; 95% confidence interval [CI]=1.7-6.4), report exposure to mumps (33%; OR=2.8; 95% CI=1.4-5.5), live in a dormitory (26%; OR=2.1; 95% CI=1.0-4.2), and be female (62%; OR=2.0; 95% CI=1.2-3.6). Factors not associated with disease included traveling, sharing a bedroom, eating or working on campus.

**Conclusion:** A mumps outbreak occurred in a highly vaccinated university population. Congregate settings may have increased risk for such outbreaks. Known exposure to mumps was associated with disease. Living in dormitories, being female or freshman were also risk factors. These characteristics may be associated with increased likelihood or increased intensity of mumps exposure.

**Keywords:** mumps, outbreak, case-control study

11:50 a.m.

**When is Pertussis Not Pertussis? Outbreak of Pertussis-Like Illness — New Hampshire, 2006**

**Authors:** Manisha Patel, K. Kirkland, L. Tondella, K. Tatti, E. Talbot, B. Slade, R. Lasky, K. Kretsinger

**Background:** Reported pertussis incidence has tripled since 2001, with 25,616 cases in 2005. Rapid diagnostics are not standardized and other cough illnesses have similar presentation. During an outbreak of pertussis-like illness, 978 health-care personnel (HCP) were tested for pertussis and 2,298 received antimicrobials. We investigated to confirm the outbreak etiology.

**Methods:** HCP with cough or upper respiratory symptoms were classified as having suspect pertussis by positive single-target (*IS481*) polymerase chain reaction (PCR) or symptoms (cough of any duration and a classic pertussis symptom: posttussive vomiting, whoop, or paroxysms). Clinical and epidemiologic data were collected through interviews. Reference laboratory testing included anti-pertussis toxin antibodies, two-target PCR (*IS481*, *ptxS1*), and isolation of *Bordetella pertussis*.

**Results:** From March-June 2006, 134 suspect pertussis cases were identified: 36 (27%) clinically and 98 (73%) by PCR. Among 96 PCR+ suspect HCP-cases interviewed, 24 (25%) reported no cough, and among HCP with cough, 31 (43%) reported no classic pertussis symptoms. Thirty-one (43%) of those reporting cough had no classic pertussis symptoms. One (1%) of 116 cases tested by two-target PCR was positive and one (3%) of 39 cases tested by serology was positive. None were culture-confirmed.

**Conclusion:** Extensive control measures were applied to contain an outbreak later determined not to be pertussis. PCR results may not be sufficient to confirm a pertussis outbreak. When an outbreak is suspected, culture for *B. pertussis* or other reference laboratory testing and early consideration of alternate pathogens should be included as part of a thorough epidemiologic investigation.

**Keywords:** pertussis outbreak, Tdap, PCR, serology, culture

Tuesday, April 17, 2007  
Concurrent Session F2: I Spy —  
Public Health Surveillance  
Habersham Room 10:45 a.m.–12:15 p.m.  
Moderator: Denise Koo

10:50 a.m.

**Evaluation of the Usefulness of Sentinel Provider Influenza-Like Illness Surveillance — Alaska, 2002–2006**

**Authors:** Ryan P. Fagan, J. McLaughlin, D. Fearey, L. Castrodale, J. Butler

**Background:** Goals of influenza surveillance include determining the temporal and geographic distribution of seasonal and pandemic influenza. Sentinel providers (SPs) are clinicians recruited by state health departments to monitor influenza activity by reporting influenza-like illness (ILI) in their practices. CDC recommends a minimum of 10 regularly reporting SPs for states with populations less than 2.5 million. SP-ILI was launched nationally in 1997 and has been used in Alaska since 2002, but the value of SP-ILI surveillance in Alaska remains unclear.

**Methods:** We evaluated the cost and usefulness of SP-ILI surveillance for determining the temporal and geographic distribution of influenza in Alaska by comparing reported SP-ILI data with virologic surveillance in each of four influenza seasons, 2002–06.

**Results:** Alaska spent approximately \$40,000 in personnel time each season to recruit SPs and conduct ILI surveillance. A median of 5.5 (range=1–9) regularly reporting SPs participated each season. A range of one to five of Alaska's six geographic regions was represented each season. Graphed SP-ILI surveillance data did not consistently track with virologic data. During March 2006, a spike in the number of ILI reports that did not match the virologic data was determined to be an outbreak of respiratory syncytial virus.

**Conclusion:** Alaska SP-ILI surveillance during 2002–06 was resource-intensive. Recruitment of an appropriate number of SPs from all regions of the state was unsuccessful. SP-ILI surveillance data were inconsistent with virologic surveillance data and nonspecific. We conclude that SP-ILI surveillance has provided limited added value to the Alaska influenza surveillance system. Resources used for SP-ILI surveillance in Alaska should instead be used to expand virologic influenza surveillance in the state.

**Keywords:** Alaska, disease outbreaks, human influenza, population surveillance, sentinel surveillance

**11:10 a.m.**

**Completeness of Nebraska's 2004 Hospital Discharge Data — How Much Is Missing?**

**Authors:** Bryan F. Buss, T. Safranek, B. Foley, T. Török

**Background:** Hospital discharge data (HDD) are used by state and federal epidemiologists to track multiple public health conditions. Despite the nationwide importance of these surveillance systems, studies that evaluate reporting completeness of these data are limited. In Nebraska, a 2004 change in electronic insurance claim submission methods by hospitals forced the state's hospital association to alter its procedures for compiling the HDD. This caused a 10% reduction in reported hospital discharges from 2003 to 2004 and may have compromised public health programs that rely on this system to track conditions and assess the impact of interventions.

**Methods:** We compared the Nebraska 2004 HDD with two vital records databases to estimate the number of missing HDD records. Nebraska birth and death certificate records were matched with HDD at the facility level. These records were linked by using common variables: admission date, discharge date, age, sex, patient's zip code, and method of delivery for births.

**Results:** Of 24,620 singleton in-hospital births identified by using vital records, 19,915 (80.9%) were contained in HDD. Of 5,972 in-hospital deaths identified by using vital records, 4,031 (67.5%) were contained in HDD. For 65 hospitals providing obstetric services, completeness of reporting ranged from 20.6% to 104.9% (median, 80.3%). For 88 hospitals with  $\geq 1$  death, completeness of reporting ranged from 0% to 100.0% (median, 58.0%).

**Conclusion:** These results indicate substantial underreporting of both in-hospital singleton births and deaths in the 2004 Nebraska HDD and calls into question reporting completeness for other health events requiring hospitalization. Public health programs that rely on these data should interpret results of HDD analysis with caution. Further study is needed to characterize which records are underreported and why.

**Keywords:** data linkage, data sources, evaluation methodology, evaluation report, surveillance

**11:30 a.m.**

**Impact of Enhanced Surveillance for Human Arboviral Diseases — New Hampshire, 2006**

**Authors:** David D. Blaney, E. Talbot, J. Stull

**Background:** Since 1996, >21,000 cases of arboviral diseases have been reported in the United States. In 2005, New Hampshire Department of Health and Human Services (NHDHHS) experienced increased arboviral disease incidence, with seven cases of eastern equine encephalomyelitis, including two deaths, identified through passive reporting. Subsequently, NHDHHS enacted enhanced passive surveillance for the 2006 arboviral season. We assessed the impact of enhanced surveillance for detecting possible cases.

**Methods:** Ten of 12 NH hospitals serving areas with arboviral transmission participated. NHDHHS screened weekly cerebrospinal-fluid (CSF) reports from these hospitals' infection-control practitioners (ICPs) to identify possible cases, defined as a viral-pattern CSF without alternative diagnosis. We compared possible cases (enhanced system) with CSF specimens routinely submitted to the NH Public Health Laboratory (PHL) for arboviral testing (passive system). The Chandra Sekar-Deming Method (CSDM) was used to determine sensitivity of each system. ICPs and NHDHHS staff were surveyed to estimate costs for the enhanced system.

**Results:** Of 43 total possible cases estimated by CSDM to have occurred, 40 (93%) were identified by enhanced surveillance, 33 (77%) by passive surveillance, and 32 (74%) by both; 1 was estimated as missed by both systems. Two CSF specimens from possible cases were submitted to the PHL for testing but not identified through enhanced surveillance. Enhanced system costs included \$32 and 15 person-hours/week/additional identified possible case. None of these possible cases were confirmed as arboviral disease.

**Conclusion:** Enhanced surveillance identified eight additional possible arboviral cases at minimal cost. Although no cases of arboviral disease were confirmed, both systems were complementary. We recommend continuing enhanced surveillance to improve detection of possible cases and enable appropriate control measures.

**Keywords:** surveillance, arboviruses, sensitivity, cerebrospinal fluid

11:50 a.m.

**Repeat Gonorrhea Infections — San Diego County, 2001–2006**

**Authors:** Swati J. Deshpande, A. Maroufi, M. Lee, R. Gunn

**Background:** Gonorrhea (GC), the second most common notifiable disease, can facilitate transmission of human immunodeficiency virus (HIV) and cause infertility and pelvic inflammatory disease among women. Persons with multiple episodes of GC infection might be members of core sexual transmission networks that maintain and spread GC throughout the community. Recognizing risk factors for repeat GC may help decrease overall rates of GC.

**Methods:** During 2001–2006 all reported GC cases in San Diego County were reviewed to identify persons with repeat GC episodes, which was defined as  $\geq 2$  GC infections that occurred  $>30$  but  $\leq 365$  days apart. Factors associated with repeat GC were analyzed including age, sex, race/ethnicity and high morbidity zip codes, defined as areas with consistently high sexually transmitted disease (STD) rates.

**Results:** Among 12,837 reported cases of GC, 759 (5.9%) repeat GC cases were identified. The mean annual repeat GC rate was 4.9/100,000 population. This rate increased by 73% from 3.7 in 2001 to 6.4/100,000 in 2006. The overall GC rate increased by 41% during the same period. Repeat GC episodes increased among men (33%) and women (275%). Although rates increased among blacks (172%) and Hispanics (93%), no increase among non-Hispanic whites was observed. Risk factors for repeat GC were being Hispanic (prevalence ratio [PR]=1.4; 95% confidence interval [CI]=1.1–1.7), being male (PR=1.6; CI=1.4–2.1), and residing in high morbidity zip codes (PR=1.3; CI=1.1–1.6).

**Conclusion:** Repeat GC cases are increasing at a higher rate than total GC cases, indicating that core sexual transmission networks might be increasing faster, compared with the general population. Intense prevention case management and partner services for persons with repeat GC should be implemented.

**Keywords:** San Diego, gonorrhea, core transmitters, infertility, follow-up studies

Tuesday, April 17, 2007  
**Session G: Women and Children First —  
Reproductive/Women's Health  
Grand Ballroom 1:45–4:00 p.m.  
Moderators: William Callaghan and  
William Sappenfield**

1:50 p.m.

**Are Women Who Experience Coercive First Intercourse More Likely to Have an Unintended First Birth?**

**Authors:** Corrine M. Williams, K. Brett and J. Abma

**Background:** Unintended pregnancies represent a public health problem because infants of unintended pregnancies are more often exposed to health risks before and after birth. In 2002, approximately one-third of recent live births were estimated to be unintended. We hypothesized that coercive first intercourse would be associated with unintended first births because research has shown victims of violence are more likely to be involved in subsequent risky sexual behaviors.

**Methods:** We produced nationally representative estimates using data from the 2002 National Survey of Family Growth. Female respondents aged 18–44 years who reported a live birth ( $n=4,334$ ) were included in the analysis. Coercion was classified as none/mild, moderate, or severe based on self-report. Unintended births include those that were mistimed (happened earlier than desired) or unwanted (happened when no future births were wanted) at conception. Logistic regression was used to estimate adjusted odds ratios (AOR) and 95% confidence intervals (CI) for the association between coercive first intercourse and unintended first birth. Covariates included risk factors for an unintended first birth, such as race/ethnicity, maternal age at delivery, and marital status at conception.

**Results:** In 2002, 17.1% of women aged 18–44 in the US experienced moderate coercion and 10.0% experienced severe coercion at first intercourse. Compared with women who experienced no coercion, women were more likely to report an unintended first birth if they experienced moderate (AOR=1.6, 95% CI=1.2–2.1) or severe coercion (AOR=2.2, 95% CI=1.5–3.3) at first intercourse.

**Conclusion:** A large proportion of women in the US experience coercive first intercourse, which is a significant predictor of unintended first births. Thus, addressing early experiences with violence may help to reduce unintended pregnancies and births.

**Keywords:** unwanted pregnancy, reproductive behavior, violence, rape

2:10 p.m.

**Racial Disparities in Neonatal Early Onset Group B Streptococcal Disease in the Era of Universal Screening: United States, 2003–2005**

**Authors:** Roopal M. Patel, K. Arnold, J. Bareta, A. Craig, K. Gershman, L. Harrison, R. Lynfield, S. Petit, A. Reingold, A. Thomas, S. Zansky, S. Schrag

**Background:** Group B streptococcus (GBS) is a leading infectious cause of neonatal morbidity and mortality. Historically, black infants were twice as likely as white infants to develop early-onset GBS disease (EOGBS), defined as onset in the first week of life. In 2002 perinatal GBS prevention guidelines recommended universal prenatal screening for maternal GBS colonization and intrapartum antibiotics prophylaxis (IAP) for carriers. The effect of universal screening on racial disparities in disease is unknown.

**Methods:** We conducted active, population-based surveillance for EOGBS in 10 states. Cases were infants < 7 days old with GBS isolated from normally-sterile sites. We used census and live birth data to calculate race-specific incidence of disease. We defined 2000-2001 as pre and 2003-2005 as post-guidelines. We used chi-square tests to determine significance of trends over time and for comparisons by period.

**Results:** Overall incidence of EOGBS declined 26% from 0.56 per 1000 live births in 2000-01 to 0.41 in 2005 ( $p < 0.02$ ). Compared to pre-guidelines, incidence in both white and black infants decreased 40% in 2003. From 2003-2005 rates remained stable (0.27-0.29) in whites but increased significantly in blacks (0.52-0.93,  $p = 0.01$ ). In 2005 incidence of EOGBS in black infants was 3.4 times (95% CI=2.5-4.6) that of whites. Although the proportion of preterm infants with EOGBS post-guidelines was higher among blacks (39% vs 23% of white infants,  $p = 0.004$ ) this difference was similar in the pre-guidelines period. Maternal receipt of prenatal care and IAP was similar by race in both time periods.

**Conclusion:** Although EOGBS incidence declined under universal screening, racial disparities in disease increased. Further population-based studies are needed to understand the causes of this increase and to identify strategies to reduce it.

**Keywords:** early onset neonatal sepsis, group B streptococcus, racial disparities

2:30 p.m.

**Underregistration of Extremely Low Birthweight Infant Deaths — Ohio, 2006**

**Authors:** Michael P. Cooper, J. Paulson, E. Conrey, B. Ramsini, R. Duffy

**Background:** Infants with birthweight <750 grams have a national neonatal mortality rate of approximately 60%. These extremely low birthweight (ELBW) infants comprise <1% of all births but account for >33% of total infant mortality. Unregistered ELBW infant deaths lead to an underestimation of the infant mortality rate. We assessed the completeness of Ohio's ELBW infant death registration to determine the extent of underregistration and to make recommendations to improve the system.

**Methods:** Using Ohio's vital statistics records, we identified all live-born infants with birthweight <750 grams, defined as ELBW infants, born during January 1–June 30, 2006. From these, we identified those with no death certificates and contacted their birth hospitals to verify that they were alive at the time of discharge from their birth hospital.

**Results:** Of 73,494 total infants born in Ohio during January 1–June 30, 2006, a total of 326 (0.4%) had birthweights <750 grams, and 181 (56%) of these ELBW infants had death certificates on file. Of the remaining 145 infants, 84 were confirmed alive at time of discharge; 20 were confirmed dead; and 41 are pending verification.

**Conclusion:** This study confirms that an underregistration of ELBW infant deaths occurred because thus far 20/145 (14%) infants without a filed death certificate were confirmed dead at the time of discharge from their birth hospital. This underestimation of ELBW deaths can lead to inaccurate infant mortality rates and can affect policy and program planning, which depend on accurate data for evaluation of program effectiveness to decrease the number of preterm infant births and deaths. Reasons for this underregistration are unknown. We recommend routine verification of ELBW infant discharge status.

**Keywords:** vital statistics, registration, infant, infant mortality rate, surveillance, epidemiology

2:50 p.m.

### Should We Be Concerned About Late-Preterm Birth and Risk for Developmental Disabilities?

**Authors:** Carrie Lazarus, R. Nonkin Avchen, O. Devine

**Background:** Preterm birth is associated with mental, physical, and behavioral disorders. The rates of preterm birth rose from 9.4% in 1981 to 12.3% in 2003, above the *Healthy People 2010* goal of < 7.6%. Driving this increase were not the early-preterm infants (20-33 weeks gestation), but the growing number of late-preterm infants (near-term, 34-36 weeks gestation). Little is known about the long-term sequelae of late-preterm births. In practice, late-preterm infants are treated more like their healthy, term counterparts. Whether this practice promotes optimal outcomes for the late-preterm infant is in question. We investigated to what extent children born premature are at an increased risk for special education services (SpEd).

**Methods:** Linked birth certificates (1989-1994) to SpEd records (1992-2004) for metropolitan Atlanta were used. The analyses of singleton births with plausible last menses and gestational age data yielded 170,039 children, with 17,648 receiving SpEd. Gestational age was calculated from birth certificates, using date of last menses. Risk ratios, population attributable fractions, and logistic regression were employed to estimate the impact of prematurity on SpEd.

**Results:** Compared with term infants (37-42 weeks gestation), early-preterm infants were at the greatest risk for services for mental retardation, orthopedic impairments, behavioral disorders or any SpEd (RR=5.5, 16.6, 1.5, 1.74 respectively); nevertheless, late-preterm births were still at risk for these services (RR=1.7, 1.8, 1.3, 1.1, respectively).

**Conclusion:** Late-preterm infants had higher rates of special services than term infants in all categories examined, including a 10% increase associated with any SpEd. Developmental outcomes for late-preterm infants might be more aligned with early-preterm infants. The impact of late-preterm birth on later developmental outcomes requires further evaluation as their incidence continues to rise.

3:10 p.m.

### Trends in Late-Onset Neonatal Group B Streptococcal Disease — United States, 1990–2005

**Authors:** Hannah T. Jordan, B. Albanese, A. Craig, M. M. Farley, K. Gershman, L. Harrison, R. Lynfield, J. Mohle-Boetani, S. Petit, A. Thomas, S. Zansky, S. Schrag; CDC's Active Bacterial Core surveillance (ABCs)/Emerging Infections Program Network

**Background:** Group B streptococci (GBS) are a leading cause of neonatal sepsis and meningitis. National prevention guidelines recommending intrapartum antibiotic prophylaxis (IAP) led to an 80% decline in GBS disease among infants <seven days old. The impact of IAP on late-onset GBS (onset on days seven-89 of life) is unknown. We characterized trends in late-onset GBS incidence and epidemiology over a 16-year period to guide prevention strategies.

**Methods:** We conducted active, population-based GBS surveillance in ten US states from 1990-2005. A case was defined by GBS isolation from a normally-sterile site in a surveillance area resident. Incidence rates were calculated per 1,000 live births in the surveillance areas. We considered 1990-1995 the pre-prevention period, 1996-2002 the transition years, and 2003-2005 the post-IAP implementation period.

**Results:** We identified 1724 late-onset GBS cases. Pre-prevention incidence (0.34-0.47/1000) remained stable through the transition (0.29-0.37/1000) and post-IAP years (0.32-0.37/1000). Incidence was higher among black infants compared to non-black infants [relative risk 3.4, 95% confidence interval (CI) 3.1-3.7]. Case-fatality ratio (average: 4%) and proportion presenting with meningitis (average: 26%) were also stable. From 2003-2005, 48% (209/437) of cases were exposed to IAP. Prematurity (birth at <37 weeks) was common among infants with late-onset GBS (213/437, 49%). Case fatality was higher among premature infants than among full-term infants (6% vs. 1%, p=0.02). None of 408 isolates tested was resistant to beta-lactams, the main antibiotics used for IAP. Of 657 serotyped isolates, types III (53%), IA (24%) and V (13%) predominated. A maternal vaccine covering these three serotypes could prevent >85% of late-onset GBS cases.

**Conclusion:** Widespread IAP use did not change the incidence or severity of late-onset GBS. Prevention strategies are needed.

**Keywords:** group B streptococcus, neonatal, surveillance

3:30 p.m.

**Cervical Cancer Epidemiology in Connecticut, 1994–2003 — Implications for Vaccination Programs**

**Authors:** Lynn E. Sosa, J.L. Hadler

**Background:** Cervical cancer accounted for ~10,370 new cases and 3,710 deaths in the United States in 2005. A vaccine against the types of human papilloma virus (HPV) responsible for 70% of cervical cancers was approved recently. We analyzed 10 years of cervical cancer data in Connecticut to determine the descriptive epidemiology and demographic risk factors for the disease.

**Methods:** Connecticut tumor registry data regarding malignant cervical cancers (excluding carcinoma in situ) diagnosed among Connecticut residents during 1994–2003 were analyzed for overall crude incidence rates by age, race, ethnicity, and urban residence and trends across time. Census data were used to calculate incidence rates.

**Results:** The 10-year mean incidence rate was 8.4/100,000 women (147 cases/year). The overall median age was 50 years. During the 10-year period, the incidence rate declined by 29%. One-third of all cases were fatal; 44% of deaths were attributable to cervical cancer. Rates for persons of Hispanic ethnicity, of black race, and for urban residents were higher than the overall rate (10.0, 11.3, and 12.1/100,000, respectively). The 10-year trends for the proportion of all cases by race, ethnicity and urban residence were significant only for Hispanic ethnicity (increasing trend, from 7.1% to 18.6%;  $p=0.008$ ). During 1999–2003, among women aged <40 years, Hispanic, black, and urban women were at increased risk, compared with white non-Hispanic, nonurban women (rate ratio=3.0, 1.7, and 1.9, respectively).

**Conclusion:** In Connecticut, urban residents, blacks, and Hispanics are at higher risk for cervical cancer. Similar disparities were observed for women aged <40 years who might represent more recently acquired HPV infections. Ensuring that the new HPV vaccine is readily available to these groups is important.

**Keywords:** human papilloma virus (HPV), cervical cancer, sexually transmitted diseases, immunization, health disparities

Wednesday, April 18, 2007

**Concurrent Session H1: Going Beyond the Two-by-Two Peavy Finalists**  
**Grand Ballroom 8:30–10:15 a.m.**  
**Moderator: Owen Devine**

8:35 a.m.

**Effect of Maternal Smoking Status on Breastfeeding Practice — Missouri Pregnancy Related Assessment and Monitoring System Survey, 2005**

**Authors:** Thomas M. Weiser, V. Garikapaty, M. Lin, R. Feyerharm, B. Zhu

**Background:** Approximately 28% of Missouri women of childbearing age smoke and 18% smoke daily during pregnancy. Smoking during and after pregnancy increases the risk for low birth-weight, respiratory infections, asthma and other conditions. Only 66% of Missouri infants are ever breast-fed, compared with 73% nationally. Smoking might negatively impact breast-feeding, further increasing risks for adverse outcomes in infants of smoking mothers.

**Methods:** The Missouri Pregnancy Related Assessment and Monitoring System was a survey conducted in 2005 among a sample of new mothers, stratified by birth-weight and residence. Surveys were mailed, with telephone follow-up, and completed within 2–12 months postpartum. Smokers were classified as previous (quit during pregnancy), light (<10 cigarettes/day), and moderate/heavy ( $\geq 10$ /day). Multivariable logistic regression and Cox proportional hazards models were used to assess breast-feeding initiation and duration, by smoking status. SUDAAN<sup>®</sup> was used to account for the complex sampling design.

**Results:** Overall, 1,789 women participated (weighted response rate=60%). Approximately 72% of women ever breast-fed (mean duration=12.1 weeks); 34% of women ever smoked while pregnant. Compared with nonsmokers, light (adjusted odds ratio [aOR]=1.7; 95% confidence interval [CI]=1.1–2.7), and moderate/heavy (aOR=1.7; 95% CI=1.0–2.7) smokers were less likely to initiate breast-feeding, after controlling for age, race, education, marital status, prenatal care, Medicaid and another household smoker. Cox regression analysis of breast-feeding duration showed light (adjusted hazards ratio [aHR]=1.8; 95% CI=1.4–2.5) and moderate/heavy (aHR=1.9; 95% CI=1.3–2.7) smokers were more likely to wean at any given time postpartum, compared with nonsmokers.

**Conclusion:** Smoking mothers initiate breast-feeding less often and wean earlier than nonsmoking mothers. Breast-feeding and smoking cessation counseling among pregnant women should address smoking effects on both the developing fetus and breast-feeding.

**Keywords:** smoking, breast-feeding, survey

**8:55 a.m.**

**Substantial Underreporting of Carbon Monoxide Poisonings — Alabama, 2005**

**Authors:** Teresa A. Morrison, D. Crocker, R. Funk, A. Stock

**Background:** Approximately 50 deaths per year are attributed to carbon monoxide (CO) poisoning from generator exhaust. However, little is known about the true frequency of CO poisonings after hurricanes, when widespread power outages are likely to increase the risk of generator-related CO poisonings. Knowing the true frequency of post-hurricane CO poisonings is important for planning effective prevention interventions. To understand the true frequency of these preventable, potentially fatal events in a post-hurricane setting, we investigated the completeness of reporting CO poisonings by Poison Control Centers (PCCs).

**Methods:** A capture-recapture study of CO poisonings for the seven days following Hurricane Katrina was conducted using both the Chandra Sekar-Deming and Chapman methods of analysis to determine two estimates of the true total number of CO poisoning events. Data on 20 individuals reported from the two Alabama PCCs were compared by person, place and time to data on 37 individuals abstracted by diagnosis code from three gulf coast hospitals in Alabama.

**Results:** An estimated 370 cases of CO poisoning occurred, yielding a completeness of reporting estimate of 5.4% using the Chandra Sekar-Deming method. Using the Chapman method, an estimated 265 cases of CO poisoning occurred, yielding a completeness of reporting estimate of 7.5%. Based on these estimates, over 90% of CO poisonings were not reported by PCCs.

**Conclusion:** Following Hurricane Katrina, CO poisonings were substantially underreported by PCCs. Underreporting during high risk events like widespread power outages limits the ability of public health officials to define the magnitude of the problem and to plan effective prevention interventions. To improve reporting, generator warning labels and other prevention messages should emphasize the importance of reporting suspected CO poisonings to PCCs.

**Keywords:** carbon monoxide poisoning, epidemiologic methods, population surveillance, poison control centers

**9:15 a.m.**

**Psychosocial Correlates of Current Smoking Among Adolescent Male Students — Thailand, 2005**

**Authors:** Lela R. McKnight-Eily, R. Arrazola, R. Merritt, A. Malarcher, N. Sirichotiratana

**Background:** An estimated 37.5% of Thai males (10.5 million) smoke despite longstanding anti-tobacco legislation and programs. Smoking prevalence is 18 times higher among males than females, and most begin smoking before 18 years of age. Understanding psychosocial correlates of smoking among adolescent males will help Thailand focus smoking prevention efforts to those at highest risk.

**Methods:** Thailand's 2005 Global Youth Tobacco Survey, a school-based, two-stage cluster survey, had 8,968 male participants (U.S. 7-9<sup>th</sup> grades). Logistic regression models were used to calculate adjusted odds ratios (AORs) for the association between current smoking (smoking at least one day in the past 30) and psychosocial correlates. All significant variables were retained in the final model.

**Results:** Overall, 17.7% of males reported current smoking. Significant psychosocial correlates included close peer smoking (AOR = 6.6; 95% confidence limit [CL] = 5.2, 8.2), secondhand smoke exposure in public (AOR = 2.0; 95% CL= 1.5, 2.6) and home (AOR =1.5; 95% CL=1.2, 1.9), offer of a free cigarette by tobacco representatives (AOR = 1.8; 95% CL =1.5, 2.3), belief that it is safe to smoke for 1-2 years (AOR = 1.6; 95% CL=1.4, 1.9), not believing smoking is harmful (AOR = 1.8; 95% CL = 1.5, 2.3), parent smoking (AOR = 1.4; 95%CL =1.2, 1.7), and exposure to anti-tobacco media (AOR = 0.8; 95% CL = 0.6, 0.9).

**Conclusion:** Environmental factors like secondhand smoke exposure and free distribution of cigarettes, are positively correlated with smoking being psychosocially acceptable. Greater enforcement of the bans on secondhand smoke and distribution of free cigarettes is necessary in Thailand. Programs targeting males' psychosocial influences, particularly smoking peers, are needed to impact future smoking-related morbidity and mortality.

**Keywords:** adolescent, smoking, tobacco, psychosocial factors

**9:35 a.m.**

**Lower Early Mortality Rates Among Patients on Antiretroviral Treatment at Clinics Offering Cotrimoxazole Prophylaxis in Malawi**

**Authors:** David Lowrance, S. Makombe, A. Harries, J. Yu, J. Aberle-Grasse, O. Eiger, R. Shiraishi, B. Marston, T. Ellerbrock, E. Libamba

**Background:** Antiretroviral treatment (ART), which is being rapidly scaled up in resource-limited settings, dramatically decreases HIV-associated morbidity and mortality. Cotrimoxazole (CTX) prophylaxis of opportunistic infections has been associated with substantial reductions in HIV-associated mortality in non-ART patients in sub-Saharan Africa. However, the effect of CTX prophylaxis on the mortality of patients on ART is currently unknown.

**Methods:** We conducted a retrospective analysis to evaluate differences in 6-month mortality between ART patients at 11 Malawi ART clinics that were (N=5) or were not (N=6) providing CTX, and were similar in patient burden, location, and facility type. Standardized abstraction was completed for 1,295 patient records, of which 1,050 met study criteria (573 patients who received CTX and 477 who did not) and were analyzed.

**Results:** The two groups were similar with respect to age, sex, and percentage of patients with WHO clinical stage as ART indication. When all defaults (patients lost to follow-up for >90 days) were excluded from the analysis, 6-month mortality rate was 11.8% in ART patients on CTX compared with 19.7% in those not on CTX (6-month mortality risk reduction 40% ( $p < 0.0011$ )). Kaplan-Meier survival curves for CTX and non-CTX patients were significantly different, regardless of whether default patients were excluded from analysis, or the percentage of default patients that were considered deaths.

**Conclusion:** ART patients at clinics offering CTX prophylaxis in Malawi had mortality reductions of 40% during the first 6 months of treatment. In this and other resource-limited settings, CTX prophylaxis could significantly improve ART patient survival because CTX is readily available, relatively inexpensive, and may have a major impact on early mortality.

**Keywords:** cotrimoxazole prophylaxis, HIV/AIDS, antiretroviral treatment, mortality, resource-limited setting, Malawi

**9:55 a.m.**

**Using Population-Based HIV Surveys To Estimate HIV Incidence in Kenya (2003), Malawi (2005), and Uganda (2005)**

**Authors:** Abhijeet Anand, R.W. Shiraishi, M. Morgan, W. Hladik, R. Bunnell, L.H. Marum, J. Aberle-Grasse, G. Bello, T. Diaz

**Background:** The President's Emergency Plan for AIDS Relief aims to prevent 7 million HIV infections in 15 resource-constrained countries. Monitoring HIV incidence can guide prevention planning to achieve this goal. We developed a method to model HIV incidence using data from population-based surveys with HIV testing.

**Methods:** Population-based survey data from Kenya, Malawi and Uganda were used to estimate HIV incidence by sex in 15-24 year olds. Weighted HIV prevalences were calculated for each year of age and smoothed using weighted least squares polynomial regression. Assuming a steady state epidemic, incidence was calculated by year of age necessary to yield a prevalence equal to that in the next year of age after accounting for expected deaths from HIV. Age-specific incidence was aggregated into 15-19 year and 20-24 year age groups. Confidence intervals were calculated by re-sampling 100,000 smoothed curves from the polynomial covariance matrix and repeating the previous two steps.

**Results:** In Kenya and Malawi, HIV incidence was highest in 20-24 year old women, 1.79% (1.06%-2.63%) and 2.41% (1.27%-3.71%), respectively. In Uganda, incidence was higher in women than men, and among women was similar in 15-19 year and 20-24 year olds, 0.90% (0.66%-1.14%) and 0.89% (0.49%-1.33%), respectively. In all three countries, HIV incidence in women was about five times higher than for men aged 15-19 years and about two times than for men aged 20-24 years.

**Conclusion:** HIV incidence can be modeled from HIV-prevalence data from population-based surveys. These estimates suggest that HIV incidence is higher in women than men and usually higher in 20-24 year olds than 15-19 year olds. HIV prevention services should be targeted toward these groups.

**Keywords:** HIV incidence, demographic health surveys, Kenya, Malawi, Uganda

Wednesday, April 18, 2007  
Concurrent Session H2: Growing Up Is Hard To Do  
— Kids and Teens  
Habersham Room  
8:30–10:15 a.m.  
Moderator: Susan Lukacs

**8:35 a.m.**  
**Second Hand Tobacco Smoke — Is There a Difference  
in Exposure by Race-Ethnicity? United States, 1999–2004**

**Authors:** Cinzia Marano, S. Schober, C. Zhang, D. Brody

**Background:** Approximately 15 million children are exposed at home to second-hand tobacco smoke (SHS), a preventable cause of respiratory illness, otitis media and asthma in children. Compared to white children, African-American children have higher levels of serum cotinine, a biological measure of SHS exposure, but lower self-reported home exposure. Understanding whether this difference is due to higher SHS exposure outside the home or other factors is important for informing public health actions to reduce children's SHS exposure.

**Methods:** We analyzed serum cotinine data from the National Health and Nutrition Examination Survey 1999–2004 for 9,005 children and adolescents aged 3–19 years. We calculated median cotinine levels stratified by home SHS exposure and race/ethnicity. We used linear regression adjusting for family poverty index ratio, number of rooms and number of cigarettes smoked in the home to assess the relationship between serum cotinine and race/ethnicity.

**Results:** In homes with no reported smoking, median serum cotinine was four times higher in African-American children (0.13 ng/ml (95% confidence interval (CI) =0.11–0.15), compared to whites 0.03 ng/ml (95% CI=0.03–0.05), and Mexican-Americans 0.03 ng/ml (95% CI=0.03–0.03). Among children with home exposure, median levels were 1.07 ng/ml (95% CI=0.97–1.16), 1.22 ng/ml (95% CI=1.00–1.49), and 0.54 ng/ml (95% CI=0.44–0.69) in African-Americans, whites, and Mexican-Americans, respectively. Racial/ethnic differences were not observed among home-exposed children when controlling for number of cigarettes smoked in the home and socio-demographic factors.

**Conclusion:** Higher cotinine levels were only seen in African-American children without home SHS exposure suggesting they may experience exposure in other environments. Although children's SHS exposure occurs primarily at home, more research is needed to define other sources to inform policies to reduce disparities in children's exposure.

**Keywords:** tobacco smoke pollution, cotinine, National Health and Nutrition Examination Survey, children, adolescents

**8:55 a.m.**  
**Outbreak of *Escherichia coli* O157:H7 at a Day Camp  
— Bergen County, New Jersey, 2006**

**Authors:** Adam J. Langer, C. Genese, N. Mangieri, L. Apa, M. Malavet, S. Matiuck, M. Orsini, S. Lee, C. Campbell, C. Robertson, C. Tan

**Background:** *Escherichia coli* O157:H7 causes outbreaks of bloody diarrhea and hemolytic uremic syndrome. Annually, 73,000 U.S. cases, 2,100 hospitalizations, and 61 deaths are reported. Young children and older persons are at increased risk of complications. In August 2006, the New Jersey Department of Health and Senior Services investigated multiple cases reported at a day camp.

**Methods:** Probable primary cases occurred among persons having diarrheal illness from August 1–6. Probable secondary cases occurred among persons who were contacts of primary cases and who experienced diarrheal illness from August 4–14. Cases were confirmed by positive Shigatoxin tests or stool cultures. All isolates underwent pulsed-field gel electrophoresis (PFGE). We investigated the environment and evaluated an onsite petting zoo. We performed a matched case-control study.

**Results:** A total of 18 primary (16 confirmed, two probable) and four secondary (three confirmed, one probable) cases were identified. Three primary case-patients were adolescent staff. The remainder were attendees aged 4–6 years. Isolates were indistinguishable by PFGE. Environmental and animal samples were culture-negative. Infection-control evaluation revealed nonadherence to hand-washing recommendations, inconsistent food-handling procedures, and insufficient hand-washing facilities. The epidemic curve indicates a point source and index case. The majority of cases were in one attendee group, but we identified no unique exposures. We identified no statistically significant associations between exposures and illness.

**Conclusion:** Deficient infection-control practices likely contributed to transmission. The presence of an index case, inability to isolate the organism from the environment, and no significant associations between camp exposures and illness demonstrates this outbreak likely resulted from outside introduction of the bacteria, with subsequent person-to-person transmission. This outbreak highlights the need to improve infection-control practices in camp settings.

**Keywords:** *Escherichia coli*; child day care centers; hemolytic uremic syndrome; disease outbreaks; disease transmission, horizontal

**9:15 a.m.**

**Community Response to School Closure Resulting from an Influenza B Outbreak — Yancey County, North Carolina, November 2006**

**Authors:** April J. Johnson, Z. Moore, P. Edelson, L. Kinnane, M. Davies, D. Shay, A. Balish, L. Finelli, F. Averhoff, M. McCarron, L. Blanton, J. Polder, J. Bresee, J. Engel, A. Fiore

**Background:** Closing schools is one proposed strategy for responding to influenza pandemics, but few studies have assessed the impact on families. From 11/2/2006 to 11/13/2006, Yancey County, North Carolina officials closed the nine-school, 2560-student school district due to influenza-like illness (ILI) and high student and staff absenteeism. County residents were also advised to avoid large gatherings. The objective of this study was to assess how families responded to these actions.

**Methods:** Respiratory specimens were tested to confirm the cause of the outbreak. Households with children in public schools were randomly selected and parents were surveyed by telephone about illness among children, work attendance, childcare arrangements and child activities during school closure.

**Results:** Influenza B was confirmed in seven of eight children tested. Of 400 selected households, information was obtained from 220 (54%) households containing 438 adults and 355 school-aged children. Illness onset from 10/23/2006 to 11/15/2006 was reported for 130 (37%) children; 65 (50%) had ILI, and 66 (51%) sought healthcare. During closure, supermarkets were visited by 145 (41%), restaurants by 120 (34%), and churches by 117 (33%) students; 156 (44%) students traveled outside the county. All adults worked in 118 (54%) households; 18% of adults could work from home and none missed work to provide childcare. Only 22 (10%) households required special childcare arrangements. Closing schools was considered appropriate by 201 (91%) respondents and 180 (84%) felt prepared.

**Conclusion:** Parents in this rural community supported the decision to close schools and did not miss work to provide childcare. However, many students visited public areas during school closure. Plans for pandemic influenza responses should address the potential for transmission in public areas during school closure.

**Keywords:** human influenza, outbreaks, schools, children

**9:35 a.m.**

**Elemental Mercury Exposure in a Child Care Center — New Jersey, 2006**

**Authors:** Mary T. Glenshaw, E. Bresnitz, J. Fagliano, R. Jones

**Background:** Elemental mercury (Hg), a heavy metal, is especially toxic when inhaled. Acute and chronic Hg exposure can produce serious health effects, including cognitive and sensorimotor impairments, renal, and dermatological conditions. In January 2004, a child care center opened in a building where Hg-containing thermometers were manufactured from 1984–1994. In July 2006, the New Jersey Department of Health and Senior Services was notified of elevated Hg levels in the building, prompting an investigation of exposed persons.

**Methods:** We established a health team of state and federal agencies, with consultation from environmental pediatricians. Initial urinary Hg testing of persons exposed since June 2006 occurred in August. Persons with levels  $\geq 5$   $\mu\text{g Hg/g creatinine}$  were retested monthly. We also reviewed medical records to assess whether health conditions of exposed persons might be related to mercury poisoning.

**Results:** Records indicate that 162 persons occupied the building since January 2004. The mean initial urinary level for 72 children tested was 4.0  $\mu\text{g Hg/g}$  (range: 0.3–17.5). In September, 22 children with initial levels  $\geq 5$   $\mu\text{g Hg/g}$  were retested (Test 2: mean 4.7  $\mu\text{g Hg/g}$ ; range: 0.8–8.7). In October, 4 children with second test levels  $\geq 5$   $\mu\text{g Hg/g}$  were retested (Test 3: mean 5.5  $\mu\text{g Hg/g}$ ; range: 2.7–9.4). Initial findings from medical record reviews indicate no obvious health conditions related to mercury exposure.

**Conclusion:** Urinary testing indicates that Hg exposure occurred. Serial retesting of persons with elevated urinary Hg levels demonstrates that levels generally decreased at rates consistent with Hg half-life, after exposure cessation. Medical record reviews continue. This investigation triggered a proposed emergency regulation and state legislation requiring environmental evaluation of child care facilities before licensure.

**Keywords:** mercury poisoning, environmental exposure, medical records, legislation

9:55 a.m.

**Media Exposure Among Children with Developmental Disabilities — United States, 2003**

**Authors:** Alexandra B. Balaji, S. Visser, A. Claussen, M. Morales, N. Molinari, R. Perou

**Background:** For a majority of children, television and computers (media) are a part of everyday life. Research has documented both positive (language development, time spent with parents) and negative (aggression, obesity) impact of media on children's health and development. There is limited information on the amount of media exposure among children with developmental disabilities (DDs) compared to children without such conditions. Understanding this relationship is important because an estimated 17%-20% of children have DDs and are at increased risk for poor health outcomes.

**Methods:** The 2003 National Survey of Children's Health was used to evaluate differences in daily media exposure among children 6-17 years of age with DDs. Data from 64,902 children (12,889 children with DDs, 52,013 without) were included. Multivariate regression analysis was used to generate adjusted odds ratios (AORs) describing the association between media exposure and DDs (learning disabilities (LD), autism, Attention-Deficit/Hyperactive Disorder (ADHD), depression, conduct/behavior problems, developmental delay/physical impairment, hearing/vision problems, and bone/joint/muscle problems) while controlling for a number of demographic characteristics.

**Results:** Children averaged 1 hour and 40 minutes of TV and 58 minutes of computer exposure daily. Children with developmental delay/physical impairment (AOR=1.11, 95% CI=1.00-1.25) and conduct/behavior problems (AOR=1.06, 95% CI=1.00-1.14) watched significantly more TV. Children with hearing/vision problems logged significantly more computer time (AOR=1.21, 95% CI=0.97-1.51).

**Conclusion:** Results indicate that there is no significant association between media exposure and most developmental disabilities in this analysis. While the significance noted for developmental delay/physical impairment and hearing/vision problems may be attributable to functional status, the positive association between TV exposure and conduct/behavior problems warrants further research. In particular, future research should examine the relationship between media content and conduct/behavior problems.

**Keywords:** mass media, child, developmental disabilities, attention deficit disorder with hyperactivity, learning disorders, depression

Wednesday, April 18, 2007  
Concurrent Session I1:  
Fragile, Handle with Care — Injury  
Grand Ballroom  
10:30 a.m.–12:00 p.m.  
Moderator: Ileana Arias

10:35 a.m.

**Use of Coroner Data for Surveillance of Drug-Overdose Deaths — Los Angeles County, California, 1999–2003**

**Authors:** Derek T. Ehrhardt, P. Simon, L. Lieb

**Background:** Vital statistics show increasing drug-overdose mortality nationally. However, these data have limited utility in surveillance of drug-overdose deaths because it may be as much as 3 years before coded cause-of-death data are ready for analysis. In Los Angeles County (LAC), un-coded coroner data on all recently investigated deaths is provided to the health department at monthly intervals and includes cause-of-death text fields.

**Methods:** To evaluate the quality of coroner data for more timely drug-overdose surveillance, LAC coroner data were compared with National Center for Health Statistics (NCHS) mortality data from 1999–2003. Drug-overdose deaths were identified from NCHS data by searching underlying and contributing cause-of-death fields for *International Classification of Disease*, Tenth Revision (ICD-10), codes X42 and X44. Drug-overdose deaths were identified from the coroner data by searching cause-of-death text fields for drugs captured by ICD-10 X42 and X44 codes and key phrases commonly used by the LAC Coroner to describe drug-overdose deaths. Drug-overdose deaths from each database were linked using name, birthdate, and date of death.

**Results:** Of 3,515 drug-overdose deaths in NCHS data, 3,253 (93%) were found in the coroner data. An additional 44 drug-overdose deaths were in coroner data but not NCHS. Coroner data revealed a 5.0% increase in LAC drug-overdose deaths similar to the 5.7% increase using NCHS data. Temporal trends in age-, sex-, and race/ethnicity-specific rates from each data source also produced similar results.

**Conclusion:** Text-field search of coroner data provides accurate information for surveillance of drug-overdose deaths. Analysis of coroner data may help to identify emerging trends in drug-overdose deaths much sooner than NCHS data and facilitate timelier and focused public health response.

**Keywords:** cause of death; coroners and medical examiners; mortality; overdose; poisoning; population surveillance; vital statistics

10:55 a.m.

**Gender Specific Mental Health and Behavioral Outcomes Among Physically and Sexually Maltreated High-Risk Youths — Northeastern Region of the United States, 2004**

**Authors:** Joseph E. Logan, R. Leeb, L. Barker

**Background:** It is estimated that 28.4% of young adults in the United States have been physically abused and 4.5% have been sexually abused before the 6<sup>th</sup> grade. Early physical and sexual child maltreatment (PS-CMT) has been linked to a variety of mental/behavioral problems in adolescence; however, little research has investigated differences in PS-CMT-related outcomes by gender and stage of pre-adolescence/adolescence among youths residing in high-risk communities.

**Methods:** We explored this area of research by using a cross-sectional study design with survey data provided by 4,131 youths in grades 7, 9, 11, and 12 who resided in a high-risk school district (81% participated). Students were considered victims of PS-CMT if they reported having either physical or sexual abuse prior to the age of 10 years. By grade level and gender, prevalence ratios (PR) were calculated to estimate the association between PS-CMT and various outcomes (e.g. violence, victimization, suicidality, illegal substance use), adjusting for race/ethnicity, witnessing neighborhood violence, and witnessing violence between caregivers prior to age 10.

**Results:** PS-CMT was positively associated with suicidality at each grade, regardless of gender. There was a stronger association between PS-CMT and perpetration of violence among females than males, in grade 7 (PRs: 1.58 versus 1.07,  $p < 0.05$ ) and grades 11-12 (PRs: 1.43 versus 1.05,  $P < 0.05$ ). Positive associations between PS-CMT and substance use, violent behavior, peer and date perpetration, and peer and date victimization were found among male and female youths as young as 12 years.

**Conclusion:** Providers should be aware that, for high-risk youths, both male and female PS-CMT victims are prone to suicidality, perpetration of violence, dating victimization, and illegal substance use as early as the 7<sup>th</sup> grade.

**Keywords:** adolescents, abuse, violence, suicide

11:15 a.m.

**Clinical Syndrome Associated with Diethylene Glycol-Contaminated Cough Syrup — Panama, 2006**

**Authors:** Fernanda C. Lessa, N. Sosa, G. Rodriguez, E.D. Rentz, L. Lewis, J. Schier, C. Rubin, J. Sejvar

**Background:** Diethylene glycol (DEG) is a toxic industrial solvent that can be fatal when ingested. Although previous DEG poisonings have occurred, the full clinical spectrum of DEG-associated illness remains undefined. Between July-October 2006, DEG contamination of cough syrup was responsible for an outbreak, in Panama, of acute renal failure (ARF) accompanied by neurologic dysfunction. We investigated the clinical features of affected patients

**Methods:** DEG poisoning cases were defined as persons admitted to Hospital A between July-October 2006 with unexplained ARF (serum creatinine  $\geq 2$ mg/dl or a two-fold increase in baseline creatinine) and known or suspected exposure to the implicated cough syrup. We collected clinical and laboratory data through patient and family member interviews and chart review.

**Results:** As of October 9, 34 patients met the case definition. Mean age was 65 years (range: 26-86 years). Thirty-one (91%) initially presented with gastrointestinal symptoms 2-7 days following ingestion. Patients were admitted with ARF (mean creatinine 13mg/dl) a median of three days after symptom onset. Twenty-three (68%) had neurologic signs including facial (12, 52%), and/or limb (11, 48%) paralysis; neurophysiology in 6 (26%) indicated severe axonal neuropathy. Despite intensive care and hemodialysis, 19 (56%) died a median of 11 days (range: 1-44 days) following hospitalization. As of October 20, two survivors had been discharged with neurologic sequelae; 13 remained hospitalized.

**Conclusion:** Longer survival time of these patients, compared to other DEG poisonings, and systematic data collection allowed for a more complete clinical description of DEG-associated illness. Facial or limb weakness with unexplained ARF should prompt clinicians to consider DEG poisoning. Early consideration of this diagnosis may assist in mitigating public health risk in future events.

**Keywords:** diethylene glycol, acute renal failure, neurologic disorders, outbreak

11:35 a.m.

**Elevated Fall-Related Mortality Rates — New Mexico, 1999–2004**

**Authors:** Aaron M. Wendelboe, Michael G. Landen

**Background:** Fall injuries affect 30% of U.S. residents aged  $\geq 65$  years and cost \$19 billion in 2000. During 2002–2004, New Mexico (NM) led the nation in annual fall-related mortality rates. We conducted a descriptive analysis to better understand the epidemiology of fatal falls in NM.

**Methods:** Unintentional falls were identified as the underlying cause of death by using NM Department of Health death-certificate data and national Web-based Injury Statistics Query and Reporting System (WISQARS) data for 1999–2004. Age-adjusted mortality rates and rate ratios were analyzed by sex, ethnicity, race, and year.

**Results:** For 1999–2004 combined, NM's fall-related mortality rate (11.3/100,000 population) was 2.0 (95% confidence interval [CI]=1.9–2.2) times the U.S. rate (5.5/100,000 population); elevated rate ratios (RR) persisted when stratified by sex ( $RR_{\text{males}}=2.0$ ;  $RR_{\text{females}}=2.2$ ), ethnicity ( $RR_{\text{Hispanic}}=2.4$ ;  $RR_{\text{non-Hispanic}}=2.1$ ), race ( $RR_{\text{White}}=2.0$ ;  $RR_{\text{Black}}=1.8$ ;  $RR_{\text{American Indian}}=2.1$ ;  $RR_{\text{Asian/Pacific Islander}}=2.4$ ;  $RR_{\text{Other}}=3.1$ ), and age ( $RR_{\geq 50 \text{ years}}=2.2$ ;  $RR_{< 50 \text{ years}}=1.4$ ). NM males and non-Hispanics had the highest mortality rates (14.4/100,000 and 11.3/100,000 population, respectively). From 1999–2004, NM's 62% percent increase in the fall-related mortality rate was more than twice the U.S. increase (28%); the increase among non-Hispanics (82%) was 4 times that among Hispanics (20%). In NM, the percent increase among males was 1.7 times that of females, whereas in the United States, the percent increase among females was 1.5 times that of males.

**Conclusion:** NM's fall-related mortality rate was twice the U.S. rate, exhibited a greater increase, and persisted across sex, ethnicity, race, and for older ages. Non-Hispanics and males accounted for the highest rates and percent increases in fall-related mortality in NM. Characterizing fall etiology is needed to develop effective prevention measures.

**Keywords:** mortality, falls, New Mexico

Wednesday, April 18, 2007  
Concurrent Session I2: The ABC's of Hepatitis  
Habersham Room  
10:30 a.m.–12:00 p.m.  
Moderator: John Ward

10:35 a.m.

**Investigation of Perinatal Hepatitis B Virus (HBV) Infections Among Marshall Islanders Living in Washington County, Arkansas — 2003–2005**

**Authors:** Gayle E. Fischer, S. Wang, S. Ahring, K. Fowler, S. Hainline, M. Chinglong, L. Jacques-Carroll, B. Bell, I. Williams

**Background:** Approximately 90% of infants infected at birth are at risk of chronic HBV infection; 15–25% die prematurely from HBV-related liver disease. Providing post-exposure prophylaxis (PEP) with hepatitis B immunoglobulin (HBIG) and hepatitis B vaccine  $< 24$  hours after birth and completing three doses of vaccine prevents 85–95% of perinatal infections. An estimated 8,000–10,000 immigrants from the Marshall Islands, a central Pacific nation where prevalence of chronic HBV infection is  $> 8\%$ , live in Washington County. We investigated PEP practices and perinatal HBV infections among Washington County's Marshallese.

**Methods:** All Marshallese births from 1/1/03–12/31/05 were identified from Washington County birth certificate records. We examined hospital records for HBV screening and PEP practices and state records for vaccination and infection status of these births and a random sample of non-Marshallese births (4:1 ratio). Perinatal HBV infection was defined as an infected infant born in the United States to an HBV-infected mother.

**Results:** We investigated 396 Marshallese and 104 non-Marshallese births; 41 (10.2%) Marshallese births were to HBV-infected women compared to zero non-Marshallese births ( $p < 0.001$ ). Marshallese were more likely than non-Marshallese to have no prenatal care (34% vs. 2%,  $p < 0.001$ ) and no pre-admission HBV screening (43% vs. 9%,  $p < 0.001$ ). PEP was initiated within 24 hours for 88% (36/41); 78% (32/41) completed the vaccine series. Of 23 tested after vaccine completion, four (17%) were HBV-infected. Infection was associated with receiving HBIG  $> 24$  hours post-delivery (3/4 infants;  $p = 0.01$ ). Delays occurred because maternal infection status was unknown at delivery (2) or incorrectly recorded (1).

**Conclusion:** Despite their high risk of HBV transmission, many Marshallese received inadequate prenatal care. To prevent perinatal infections, attention to timely screening and PEP is needed.

**Keywords:** hepatitis B, perinatal care, hepatitis B vaccine, infant

**10:55 a.m.**

**Outbreak of Hepatitis A Associated with Contaminated Spring Water — North Carolina, 2006**

**Authors:** Zackary S. Moore, P. Jenkins, K. Simeonsson, A. Massey, J. Lounsbury, M. Salyers, K. Rowland, M. Sobsey, D. Love, L. Tallon, L. Ganova-Raeva, G. Xia, J. Li, L. Jaykus, E. Papafragkou, and M. Davies

**Background:** Hepatitis A virus (HAV) caused approximately 19,000 cases of acute liver disease in the United States in 2005; 1/3 of these required hospitalization. In August 2006, the North Carolina Division of Public Health was notified of four hepatitis A cases among persons visiting or residing on a farm in western North Carolina (Property A). We investigated to determine the mode of transmission and to implement control measures.

**Methods:** We defined a case as acute illness occurring after visiting or residing on Property A during May–August 2006, with 1) jaundice or elevated serum aminotransferase levels and 2) detection of anti-HAV IgM or epidemiologic link to a laboratory-confirmed case. To evaluate exposures, we administered a questionnaire to available persons who were present on Property A during this period. We tested water and randomly-selected produce samples for HAV. We compared HAV isolates from human and environmental samples by sequencing a 269 base-pair section of the *VP1–VP3* region.

**Results:** We identified 16 cases among residents of three states. Onsets ranged from July 5 to September 10, 2006. Patients were aged 18–34 years; 69% were male. Detailed exposure information was available for five case-patients and five non-ill persons. All five case-patients and one non-ill person reported drinking water from the spring ( $p=0.047$ , Fisher's exact test). No other exposures were associated with illness. HAV isolates from human and water samples were identical in the region examined. No HAV was identified in produce.

**Conclusion:** This outbreak was likely caused by ingestion of contaminated spring water. We recommended boiling water and creating an alternative water source. Application of molecular techniques allowed for early identification of the reservoir of infection.

**Keywords:** hepatitis A, waterborne, water microbiology, disease outbreaks, reverse transcriptase polymerase chain reaction

**11:15 a.m.**

**Hepatitis C Virus Infection Among American Indian Women Seeking Prenatal Care — Northern Plains, 2005–2006**

**Authors:** Christine Dubray, J.T. Redd, K. Byrd, C.M. Town, J.E. Cheek

**Background:** Approximately 4.1 million persons in the United States are positive for antibodies to hepatitis C virus (anti-HCV), representing a prevalence of 1.6%. However, the epidemiology of hepatitis C virus infection among American Indians (AI) is poorly documented. Because of suspected high local prevalence, two Indian Health Service (IHS) facilities on the Northern Plains implemented universal prenatal HCV screening in July 2005. We investigated HCV epidemiology among AI women seeking prenatal care at these facilities after universal screening was instituted.

**Methods:** We performed a retrospective review of HCV screening results among AI women who received a first prenatal-care visit in either facility during July 1, 2005–July 31, 2006. A case of HCV infection was defined as presence of anti-HCV by enzyme immunoassay (EIA), verified by either recombinant immunoblot assay (RIBA<sup>®</sup>) for anti-HCV (past or current infection) or by nucleic acid testing (NAT) for HCV RNA (current infection).

**Results:** Of 234 women, 193 (82.5%) were screened for HCV, and 15 were positive for anti-HCV by EIA. Of these 15, RIBA<sup>®</sup> testing was performed for 12, and presence of anti-HCV was confirmed for 10; no NAT was performed to identify current infections. Overall anti-HCV prevalence was 5.2% (10/193; 95% confidence interval [CI]=2.5–9.3). Prevalence by age group was <15 years, 0% [95% CI=0–84.2]; 15–24 years, 5.9% [95% CI=2.4–11.7]; 25–34 years, 4.9% [95% CI=1.0–13.7]; and 35–44 years, 0% [95% CI=0–28.5].

**Conclusion:** Our investigation indicated a higher than expected prevalence of HCV infection among this AI prenatal-care population. A case-control study is planned to identify risk factors associated with HCV infection in this community and to guide appropriate prevention measures.

**Keywords:** hepatitis C, infection, American Indians, prevalence, prenatal care

11:35 a.m.

**Infection-Control Practices in Assisted Living Facilities: A Response to Hepatitis B Outbreaks Associated with Blood Glucose Monitoring — Virginia, 2006**

**Authors:** Ami S. Patel, M.B. White-Comstock, J. Perz, R. Novak, D. Woolard

**Background:** As the U.S. population ages, medical needs of the approximately one million persons residing in assisted living facilities (ALFs) increase. Unlike nursing homes, ALFs are not subject to federal oversight; state regulations governing infection control (IC) are variable. In 2005, two outbreaks of acute hepatitis B in Virginia ALFs were associated with sharing fingerstick devices, despite recommendations against this practice. We initiated a study to characterize IC practices, identify educational needs, and determine compliance with guidelines.

**Methods:** We sent letters to Virginia ALFs informing them of IC guidelines and recommendations regarding glucose monitoring and diabetes care. A follow-up survey consisting of observational tours and standardized interviews with supervisors was conducted among a size-stratified random sample of ALFs. Differences among IC practices according to size and ownership were assessed by using chi-square.

**Results:** Forty-nine of 155 central Virginia ALFs were surveyed. Forty-four ALFs used penlet fingerstick devices, and six (12%) shared these without cleaning between residents. Glucometers were shared in 16% of ALFs. Sharing practices did not differ by facility size or ownership. Thirty-seven percent of ALFs reported using safety lancets. Only 21% used autodisable needles to administer injectable medications. Thirty-five percent of ALFs did not offer employees hepatitis B vaccine (HBV) as required by the Occupational Safety and Health Administration (OSHA). HBV vaccine was less frequently offered at ALFs that had <50 residents ( $p < 0.01$ ) or were individually owned ( $p = 0.01$ ).

**Conclusion:** Despite outreach and long-standing recommendations, >35% of ALFs surveyed were noncompliant with federal guidelines (e.g., OSHA bloodborne pathogen standards). Public health and licensing agencies should work with ALFs to implement IC measures in preventing disease transmission.

**Keywords:** infection control, hepatitis B, glucose monitoring, assisted living

Monday-Friday Poster Session

Meet the Authors

Grand Ballroom

12:30–1:30 p.m.

Posters 18–23: We Still Fly Coach — International Posters 24–30: Hot and Bothered

**Poster 18**

**Community Household Survey To Describe Healthcare Utilization Practices and Risk Factors for Diarrheal Diseases in the Department of Santa Rosa, Guatemala — 2006**

**Authors:** Wences Arvelo, N. Padilla, O. Henao, H. Jordan, N. Pezzarossi, L. Reyes, E. Mintz, K. Lindblade

**Background:** In Guatemala, diarrhea is a leading cause of death in children. Persons with poor access to safe water and handwashing facilities have increased risk of acquiring enteric pathogens that cause diarrhea. We conducted a community survey to understand healthcare utilization practices and risk factors for diarrhea in Santa Rosa, Guatemala and to improve surveillance and prevention strategies.

**Methods:** We used two-stage cluster sampling with probability proportional to size to select households from 60 populated areas. Household members were interviewed using a standardized questionnaire. A diarrhea case was defined as  $\geq 3$  loose stools per day in a person during the previous month. Well-persons had no reported diarrhea in the previous month. Odds ratios (OR), and 95% confidence intervals (CI) were calculated.

**Results:** From October 10 through December 13, 2006, we surveyed 5361 persons in 1116 households; 399 (7%) cases were identified. Among cases, 237 (59%) sought care outside their home; 58 (15%) visited a health center, 30 (8%) a health post, and 4 (1%) went to a hospital. When compared with well-persons, cases were more likely to obtain drinking water from public wells (OR 2.9; 95% CI 1.1 – 7.9) or rainwater (OR 2.4; 95% CI 1.4 – 4.3), and to store it in barrels (OR 2.3; 95% CI 1.3 – 4.1). Cases were less likely to have a bathroom sink (OR 0.3; 95% CI 0.2 – 0.5).

**Conclusion:** In Santa Rosa, < 25% of persons with diarrhea seek care in health centers, posts, or hospitals, so surveillance in these sites will underestimate the disease burden. Prevention strategies may include improving access to safe water, promoting water storage that reduces contamination, and increasing availability of handwashing facilities within households.

**Keywords:** diarrhea, Guatemala, community survey, epidemiology, surveillance

## Poster 19

### Sandal-Leather Epidemiology: A Prolonged Outbreak of Typhoid Fever — Majuro, Republic of the Marshall Islands, November 2005–July 2006

**Authors:** Sharon K. Greene, A. Schmitz, Z. Zachraias, S. Elbourne, A. Hicking, N. Garrett, J. Lockett, D. Talkington, J. Pruckler, E. Mintz

**Background:** Typhoid fever, endemic in many Pacific Islands, causes 21 million infections and 200,000 deaths worldwide each year. Between one and seven culture-confirmed cases are diagnosed each year at Majuro Hospital, the main hospital in the Republic of the Marshall Islands (RMI) (population: 63,579). During November 2005–July 2006, 41 (27 culture-confirmed) patients were identified. Seventeen were hospitalized and one died. We conducted a case-control study to explore risk factors for illness.

**Methods:** Among patients with typhoid-like illness between December 2005 and July 2006, we defined those from whom *S. Typhi* was isolated as “confirmed,” and those from whom uncharacterized Gram-negative bacteria were isolated as “probable” cases. Controls were case-patients’ well neighbors matched by age. Seven *S. Typhi* isolates were tested at CDC for antimicrobial resistance and pulsed-field gel electrophoresis (PFGE) pattern.

**Results:** We enrolled 31 patients (23 confirmed, eight probable) and 92 matched controls. Exposures of interest included swimming (21 [68%] patients and 49 [53%] controls, matched odds ratio [mOR]=3.0, exact 95% confidence interval [CI] 0.8–12.0) and drinking bottled water (26 [84%] patients and 63 [68%] controls, mOR=2.5, exact 95% CI 0.8–8.7). The local plant that produced bottled water consumed by 23 (74%) patients performed no microbiologic testing, but testing of the final product by the RMI-Environmental Protection Agency repeatedly yielded coliform bacteria. All isolates were susceptible to all antimicrobial agents tested. Four were indistinguishable by PFGE; the other three isolates had distinct PFGE patterns.

**Conclusion:** The epidemiologic and laboratory evidence suggest a widely distributed, intermittently contaminated vehicle or general environmental source of infection. Sustained improvements in water quality and sanitation are warranted; targeted vaccination campaigns may be a viable disease control strategy.

**Keywords:** case-control studies, disease outbreaks, pulsed-field gel electrophoresis, *Salmonella Typhi*, typhoid fever, water supply

## Poster 20

### Oral Health Status and Treatment Needs Among Refugees — Kigoma Region, Tanzania, 2006

**Authors:** Freder Jaramillo, E. Beltrán, L. Barker

**Background:** Conducted in Winter 2006, this is the first oral health assessment of refugees at two camps existing for 10 years: Mtabila (n≈60,000 Burundians) and Nyarugusu (n≈80,000 Congolese).

**Methods:** Health workers identified a convenience sample of refugees: children aged 4–5 years (n=50 Burundians and n=49 Congolese); adolescents aged 12–15 years (n=41 and n=50); and adults aged 20–60 years (n=53 and n=50). Two CDC dentist/epidemiologists conducted intra-oral examinations for caries, periodontal disease (both may lead to tooth loss), and urgency of treatment needed (measured as presence of untreated disease and oral pain), using CDC and World Health Organization protocols. Data were managed in EpiInfo. Small-sample *t*,  $\chi^2$  and Fisher’s exact tests were calculated in SAS.

**Results:** Dental caries was more prevalent among Burundian than Congolese children and adults (64% vs. 37%, *p* = 0.007; 70% vs. 44%, *p* = 0.008), with no statistical difference among adolescents (31% vs. 26%, *p* = 0.553). In both groups, among those with caries, >90% of caries in children and adolescents were untreated, and >25% of adults had missing teeth. Congolese adults had a higher prevalence of periodontal disease (measured as pockets >4mm) than Burundians (40% vs. 22%, *p* = 0.015). A higher proportion of Burundians reported oral pain compared with Congolese (25% vs. 13%, *p* = 0.008).

**Conclusion:** Despite sampling limitations, results indicate high need for curative care among all age groups. Differences in disease patterns between Burundian and Congolese may reflect socio-cultural differences, and suggests the need for different preventive, educational, and curative interventions. These should stress fluorides to prevent caries among Burundians and improved self-care and professional tooth cleaning to prevent periodontal diseases among Congolese.

**Keywords:** dental caries, periodontal disease, treatment needs

## Poster 21

### Prevalence of Dengue Virus Nucleic Acid in Blood Products Donated in Puerto Rico

**Authors:** Hamish Mohammed, S. Stramer, K. Tomashek, J. Muñoz, J. Linnen, L. Petersen

**Background:** Case reports of transfusion-associated transmission of dengue virus are limited but this problem may be more widespread than documented. In endemic areas such as Puerto Rico, donated blood components may be affected because many dengue infections are asymptomatic. This study attempts to determine the prevalence of dengue virus among blood donors to the American Red Cross (ARC) in Puerto Rico.

**Methods:** Samples from all blood donations to ARC sites in Puerto Rico from September 20, 2005 to December 4, 2005, just after the peak of dengue season, were tested for the presence of dengue viral RNA by a dengue virus-specific nucleic acid amplification test (NAT). A laboratory-positive case was defined as one having two repeatedly-reactive NAT test results, while a laboratory-negative case was defined as one that was not initially- or repeatedly-reactive. Confirmatory testing was conducted on laboratory-positive specimens to identify infecting dengue serotype(s). The prevalence of laboratory-positive cases was determined. Associations between donor demographic characteristics and laboratory-positivity were assessed using exact methods.

**Results:** There were 16,521 blood samples donated during the study period. The mean donor age was 38 years (range: 13-85). Most (64.5%) donors were male, and 40.1% were from the San Juan metropolitan area. Twelve (0.07%) were found to be laboratory-positive. Dengue serotypes 2 and 3 were identified as the infecting viruses. Occurrence of laboratory-positive cases did not vary over time nor did they cluster by donation site. No donor demographic characteristics were associated with laboratory-positivity.

**Conclusion:** The finding that nearly 1 in 1000 donor blood samples contain dengue virus underscores the potential risk of transfusion-associated dengue transmission. Screening for dengue virus should be considered as part of the blood donor screening regimen in endemic areas.

**Keywords:** dengue fever, blood transfusion, NAT

## Poster 22

### Performance of Rapid Diagnostic Tests for Chagas Disease — Arequipa, Peru, 2006

**Authors:** Jennifer R Verani, A. Seitz, R.H. Gilman, F. Steurer, C. Todd, N. Bowman, V. Kawai, V. Pinedo Cancino, L. Cabrera, M. Verastegui, C. Bern

**Background:** Chagas disease affects an estimated 11 million people throughout the Americas, causing significant morbidity and mortality. Early detection is crucial for timely treatment and prevention of transmission through blood transfusion and organ transplantation. Recombinant-antigen-based rapid serologic tests have shown high sensitivity and specificity in specimens from several endemic countries, yet no specimens from Peru were included in published studies.

**Methods:** We evaluated two rapid tests in specimens from a community-based serosurvey in Arequipa, Peru. Specimens positive by three conventional serologic assays using whole parasite antigens (enzyme-linked immunosorbent assay, immunofluorescence assay, and radio-immunoprecipitation assay) were considered confirmed positives, while specimens negative by two or more conventional assays were considered confirmed negatives; specimens with discordant conventional results were excluded from analysis. Two independent observers interpreted each rapid test. Sensitivities, specificities, and kappa coefficients for inter-observer agreement for rapid tests were calculated.

**Results:** Ninety-seven specimens were confirmed positives, 224 were confirmed negatives and 44 were excluded. Test A demonstrated a sensitivity of 26.6% (95% CI: 18.0-36.7%) by observer 1 and 33.0% (23.8-43.3%) by observer 2; the specificity was 99.6% (97.5-100%) and 99.6% (97.5-100%) respectively. Test B sensitivity was 53.8% (43.1-63.9%) and 54.6% (44.2-64.8%); specificity was 98.7% (96.1-99.7%) and 98.2% (95.5-99.5%). Kappa coefficient for inter-observer agreement was 0.765 (0.638-0.893) for test A and 0.866 (0.792-0.940) for test B.

**Conclusion:** These results demonstrate unacceptably low sensitivity of two rapid recombinant-antigen-based tests for Chagas disease on samples from Arequipa, Peru. The poor performance may be related to an unusual parasite strain in Arequipa. The rapid tests were difficult to interpret, with disagreement between readers. Recombinant-antigen-based tests for Chagas disease may vary in sensitivity in different geographic areas.

**Keywords:** Chagas disease/diagnosis/epidemiology; *Trypanosoma cruzi*; reagent kits, diagnostic; recombinant proteins/diagnostic use; sensitivity and specificity; serologic tests

### Poster 23

#### Management of Children with Severe Febrile Illness at Peripheral Health Facilities — United Republic of Tanzania, 2006

**Authors:** Nicholas Walter, T. Lyimo, J. Skarbinski, B. Flannery, P. Kachur

**Background:** Infections that present as severe febrile illness, such as malaria and pneumonia, are a leading cause of death in children <5 years old (under-5s) in Tanzania. The World Health Organization's Integrated Management of Childhood Illness (IMCI) guidelines for outpatient assessment and treatment of common childhood illnesses have been shown to be life-saving in low-resource settings. According to IMCI guidelines, under-5s with severe febrile illness should receive parenteral antibiotics and antimalarials, and prompt referral to a hospital. We assessed health workers' (HWs) adherence to and attitudes towards these guidelines.

**Methods:** We surveyed all HWs caring for under-5s at 53 peripheral health facilities in four districts. HWs provided case synopses of the last five severely ill under-5s they had seen. Proportions of under-5s with severe febrile illness who received parenteral antibiotics and antimalarials, and referral were calculated using SUDAAN accounting for clustering at the health facility and HW level.

**Results:** Sixty nine HWs provided data on 243 under-5s with severe febrile illness. Only 27.2% [95% confidence interval (95% CI): 21.2–34.0] of under-5s with severe febrile illness were administered a parenteral antibiotic and 65.8% (95% CI: 57.9–73.0) were administered a parenteral antimalarial. Only 26.8% (95% CI: 18.6–36.9) of under-5s with severe febrile illness were referred to the hospital. Most HWs [62.3% (95% CI: 49.9–73.3)] stated that they commonly cared for severely ill under-5s without referral; 84.1% (95% CI: 73.1–91.1) felt that they could manage potentially life-threatening illnesses without referral.

**Conclusion:** HWs deliver many life-saving interventions, but overestimate their ability to manage severe febrile illness and consequently miss critical opportunities. Interventions to improve management should address HW attitudes towards referral and empiric parenteral treatment.

**Keywords:** malaria, pneumonia, referral and consultation, guideline adherence

### Poster 24

#### Risk Factors for Gonorrhea Among Heterosexuals — San Francisco, 2006

**Authors:** Pennan M. Barry, C. Kent, K. Ahrens, J. Klausner

**Background:** Gonorrhea, the second most common reportable disease nationwide, has substantial health sequelae (e.g., infertility, pelvic inflammatory disease), and increases the risk of human immunodeficiency virus transmission. In San Francisco, we observed substantial increases in gonorrhea among young heterosexuals during 2003–2005. We conducted a case-control study to identify intervention strategies for prevention and control.

**Methods:** We interviewed case-patients, defined as San Francisco residents with lab-confirmed gonorrhea during February–July 2006, and control subjects selected at the local Department of Motor Vehicles office. We included sexually active heterosexuals aged 15–35 years. Analyses were stratified by sex.

**Results:** We interviewed 24 male and 28 female case-patients and 98 male and 75 female control subjects. Among males, there was no association between age and gonorrhea, but black race (odds ratio [OR]=5.7; 95% confidence interval [CI]=2.0–16.7) was associated with gonorrhea. Controlling for race among males, having had an anonymous partner (OR=7.5; 95% CI=2.3–24.5), meeting partners in a bar/club (OR=4.3; 95% CI=1.4–13.2), and long-term partnerships (OR=0.3; 95% CI=0.1–0.8) were associated with gonorrhea. For females, being black (OR=2.6; 95% CI=1.0–6.3) or aged 15–19 years (OR=2.8; 95% CI=1.1–7.3), or having had a black partner (OR=8.3; 95% CI=3.0–23.2) increased infection risk. Controlling for age and black race (subject or partner) among females, having had a recently incarcerated partner (OR=7.0; 95% CI=1.0–47.3) or meeting partners in a bar/club (OR=6.4; 95% CI=1.2–32.4) or on the street (OR=25.0; 95% CI=2.8–225.4) were associated with gonorrhea.

**Conclusion:** Demographic and behavioral factors increase risk for gonorrhea among heterosexuals in San Francisco. Prevention and control efforts are focusing on racial disparities, incarcerated populations, and venue-specific sexual networks.

**Keywords:** gonorrhea; sexually transmitted diseases, bacterial

## Poster 25

### Cryptosporidiosis Outbreak and Follow-Up Study — Douglas County, Colorado, 2006

**Authors:** Tegan K. Boehmer, N. Alden, T. Ghosh, R. Vogt

**Background:** *Cryptosporidium* species account for two-thirds of waterborne gastroenteritis outbreaks in chlorinated recreational venues. Cryptosporidiosis is characterized by severe diarrhea lasting 1–3 weeks. On August 23, 2006, Tri-County Health Department was notified of gastroenteritis among persons who had attended a party at a community swimming pool. An investigation was initiated to identify risk factors for illness and to implement control measures. A follow-up study was conducted to examine secondary transmission, illness duration, and treatment effects.

**Methods:** A cohort study (n=37) was conducted. Confirmed cases occurred among persons who had all of the following: 1) diarrhea ( $\geq 3$  loose stools per day), vomiting, or abdominal cramps; 2) symptom onset 2–10 days after pool visit; and 3) a stool specimen that tested positive for *Cryptosporidium*. Probable cases met the first two criteria. Pool water and filter samples were tested for *Cryptosporidium*.

**Results:** Of 21 party attendees, 12 (57%) became ill (seven confirmed, five probable). Attack rates were higher among swimmers than nonswimmers (71% versus 0%; relative risk=undefined;  $p=0.02$ ) and among those who had swallowed pool water, compared with those who had not (100% versus 29%; relative risk=3.5;  $p=0.03$ ). Among 16 nonattendees, secondary attack rate was 25%. Median illness duration was 26 days. Thirteen (87%) patients were treated with nitazoxanide, of whom six (46%) had persistent symptoms posttreatment. The pool met chlorination guidelines and used ultraviolet disinfection. *Cryptosporidium* was not detected in pool water and filter samples.

**Conclusion:** Illness was associated with pool water exposure despite adherence to swimming pool regulations and use of recommended ultraviolet disinfection. Symptom duration was longer than expected posttreatment. The effectiveness of supplemental disinfection for and treatment of *Cryptosporidium* requires further study.

**Keywords:** *Cryptosporidium*, disease outbreaks, follow-up studies, swimming pools

## Poster 26

### Man's Best Friend? Dog-Associated Risk Factors for Human Plague — New Mexico and Colorado, 2006

**Authors:** L. Hannah Gould, A. Wendelboe, D. Tanda, M. Bradbury, P. Ettestad, J. Pape, K. Griffith, P. Mead

**Background:** Plague is a rare but often fatal zoonosis endemic to the western United States. In 2006, twelve cases of human plague, with two fatalities, were reported from New Mexico and Colorado. Previous studies have identified contact with pets as a potential risk factor for infection.

**Methods:** To better define the risks associated with pets at both the household and individual level, we surveyed plague survivors, their household members, and age and neighborhood matched controls using a written questionnaire.

**Results:** We enrolled nine patients diagnosed with plague in 2006, 12 family members, and 30 matched controls. Five (55%) patients were male; the median age was 45 years. Overall, 79% of households had at least one dog, 59% had at least one cat, and 33% used flea control, with no significant differences between case and control households. Four (44%) patients had contact with a sick dog versus no (0%) controls (matched odds ratio, [MOR]=18.5, 95% Confidence Interval [CI]=2.3- $\infty$ ), and four (44%) patients reported sleeping in the same bed with a pet dog versus three (10%) controls (MOR=5.7, 95% CI=1.0-31.6). Within case households with multiple members, 2 (40%) of 5 patients slept with their dog versus none (0%) of 12 healthy family members ( $p=0.07$ ). No exposures to cats were significant.

**Conclusion:** Domestic dogs play a role in the epidemiology of plague in the United States. Our findings suggest that sleeping in the same bed as a dog may increase the risk of infection, most likely by facilitating exposure to fleas. Dog-owners in endemic areas may be able to reduce their risk of infection by using flea control products and by not allowing dogs to sleep in their bed.

**Keywords:** plague; fleas; animals, domestic; zoonoses

#### Poster 27

### Heat-Related Deaths — New York City, July–August, 2006

**Authors:** Bruce J. Gutelius, L. Thorpe, T. Matte

**Background:** Heat-stroke deaths are preventable but do not account for all deaths attributable to heat. During July 27–August 5, 2006, a heat wave in New York City (NYC) caused 40 heat-stroke deaths. We analyzed these deaths and changes in natural-cause mortality during the heat wave to identify prevention opportunities and to assess overall heat-wave-related mortality.

**Methods:** We reviewed medical examiner charts for deaths classified as heat-stroke (meeting two of three criteria: rectal temperature  $\geq 105^\circ\text{F}$  at death, environmental evidence of heat contributing to death, and no other identified cause) among NYC residents during July 27–September 6. We also compared the observed natural-cause mortality rate (i.e., excluding external causes [e.g., heat stroke]) during the heat wave to the expected rate, using Poisson regression.

**Results:** Among heat-stroke decedents, median age was 64 years (range=33–99); 21 (53%) were aged  $\geq 65$  years; 23 (58%) were male; 27 (68%) had had multiple medical problems; 21 (53%) had lived with friends or family; 22 (55%) died at home; and two (5%) had had a working air conditioner. Natural-cause mortality during the heat wave increased by 8%, representing ~100 excess deaths.

**Conclusion:** The majority of heat-stroke deaths involved older persons and persons with multiple medical problems. Half the decedents were living with others when they died. Prevention programs should educate friends and family of persons at risk about heat-related illness and encourage relocation of such persons to air-conditioned environments during heat waves. The increase in natural-cause mortality was substantial but consistent with recent heat waves in NYC. Substantial increases in natural-cause mortality reinforce the need for such analyses, in addition to heat-stroke surveillance, to quantify effects of heat waves.

**Keywords:** heat, temperature, heat stroke, death, mortality, environmental exposure

#### Poster 28

### Outbreak of Methicillin-Resistant *Staphylococcus aureus* Infections Among a Football Team — West Virginia, 2006

**Authors:** Aron J. Hall, D. Bixler, L. Haddy, H. Tweel, R. Patton

**Background:** Community-associated methicillin-resistant *Staphylococcus aureus* (MRSA) infections are an important emerging public health problem, with multiple outbreaks identified among athletic teams. We investigated an outbreak of MRSA among a college football team to determine risk factors and recommend control measures.

**Methods:** An environmental assessment of training facilities and a cohort investigation of the team were conducted. Of 109 players on the team roster during the outbreak, 88 (81%) were interviewed. Confirmed cases were defined as clinical diagnosis of cellulitis or staphylococcal infection with two or more signs of inflammation, symptom onset after training camp began, and positive MRSA culture. Suspected cases met the first two criteria only. Available culture isolates were typed by pulsed-field gel electrophoresis (PFGE).

**Results:** Nineteen suspected and six confirmed cases were identified; five (20%) patients required hospitalization. PFGE results of culture isolates identified two different MRSA strains. The cohort investigation identified player positions with the most physical contact (offensive linemen, defensive linemen, and tight-ends) at greatest risk for developing infection (relative risk [RR]: 5.1; 95% confidence interval [CI]: 2.3–11). Other risk factors included recent team-related cuts or wounds (RR: 1.9; 95% CI: 0.95–3.7), use of therapeutic hot packs (RR: 2.5; 95% CI: 1.1–5.7); and training room equipment use (RR: 2.1; 95% CI: 1.1–4.1). The environmental assessment revealed multiperson use of hot packs and other training equipment between disinfection and use of inadequate disinfection solutions.

**Conclusion:** This outbreak primarily affected players in positions with increased physical contact. It was further facilitated by team-related wounds and inadequate disinfection of therapeutic and training equipment. In response, team management implemented improved infection-control practices and hygiene policies, and they provided team education.

**Keywords:** *Staphylococcus aureus*, methicillin resistance, drug resistance, football, sports

### Poster 29

#### Too Hot To Handle? Heat-Related Illness Mortality During a Heat Wave and Power Outage — Missouri, 2006

**Authors:** Thomas M. Weiser, M. Lin, C. Braun, L. Harris, B.P. Zhu

**Background:** Heat-related illness (HRI) causes approximately 700 deaths in the United States annually. Missouri is the only state where HRI is reportable. During July 19–26, 2006, Missouri experienced a heat wave (with an average daily maximum heat index of 106°F) and a large-scale power outage affecting >500,000 residents in St. Louis and adjacent counties. Hospital-based syndromic surveillance detected a sudden surge in HRI.

**Methods:** Routine surveillance data and all-cause mortality were analyzed to further assess the public health impact of HRI. Surveillance data included reports from health-care providers, local public health agencies, and death certificates. Relative risks (RR) and 95% confidence intervals (95% CI) were calculated to compare HRI mortality rates by age and race. Poisson regression was used to compute daily excess mortality controlling for highest daily temperature, humidity, month, and day of the week.

**Results:** Twenty-four confirmed HRI cases were reported from the areas affected by the heat wave and power outage. Eight persons died, comprising 32% of all confirmed HRI deaths in 2006. All deaths occurred indoors, and none was associated with work or outdoor exertion. Risk factors for death caused by HRI included male sex (vs. females) (RR=7.48; 95% CI=0.92–60.77), age ≥65 years (vs. <65) (RR=4.18; 95% CI=1.00–17.49), and black race (vs. white) (RR=3.91; 95% CI=0.98–15.63). During the heat wave, 22 excess deaths from all causes occurred in the power outage area.

**Conclusion:** The combination of heat wave and power outage exposed residents of affected areas to increased HRI specific and all-cause mortality. HRI surveillance and excess all-cause mortality estimation are valuable for determining risk factors, public health impacts of heat waves, and for intervention planning.

**Keywords:** heat, mortality, surveillance

### Poster 30

#### Outbreak of *Coccidioidomycosis* in a State Prison — California, 2005

**Authors:** Jean W. Yuan, C. Wheeler, L. Cammidge, D. Vugia, R. Kanan, J. Mohle-Boetani

**Background:** *Coccidioidomycosis* (CM) is a fungal infection acquired through inhalation of *Coccidioides* spores, which can result in severe disease. Certain California state prisons are in regions endemic for *Coccidioides* species, but most inmates are not from endemic regions and are susceptible to CM. We investigated a 2005 outbreak of CM in a state prison to assess risk factors and to recommend prevention measures.

**Methods:** We defined a case as clinical and laboratory evidence of CM in an inmate at this prison in 2005. To assess surveillance bias, we examined changes in laboratory testing and physician accessibility at the prison. We examined regional precipitation, calculated rates of infection by risk factor, and used logistic regression to assess independent risk factors.

**Results:** We identified 166 cases at the prison; 7% of patients experienced disseminated CM; 18% were hospitalized; four died. The rate at the prison (4,912 cases/100,000 population) was 600 times greater than in the surrounding county. Surveillance bias resulting from increased laboratory testing or physician access did not account for the increase in CM cases. In 2005, an unusual weather pattern was conducive to *Coccidioides* species growth and dissemination. Illness was associated with chronic medical conditions (odds ratio [OR]=2.1; 95% confidence interval [CI]=1.4–3.3), black race (OR=2.7; 95% CI=2.0–3.6), and residence in a unit with increased outdoor exposure (OR=2.4; 95% CI=1.4–4.4).

**Conclusion:** Under conducive weather conditions, CM risk was higher among prison inmates with chronic medical conditions, of black race, or with increased outdoor exposure. We recommended excluding inmates at high risk from prisons in *Coccidioides*-endemic areas and decreasing inmate exposure to airborne dirt at these prisons.

**Keywords:** *coccidioides*; *coccidioidomycosis*; prisons; lung diseases, fungal; AIDS-related opportunistic infections/epidemiology

**Session J: You Came To Get Better — Health Care  
Grand Ballroom  
1:30–3:45 p.m.  
Moderator: Clifford McDonald**

**1:35 p.m.  
Cluster of *Burkholderia cepacia*-Complex Among Non-Cystic Fibrosis Patients in a Pediatric Hospital — Chicago, 2006**

**Authors:** Cynthia A. Lucero, A. Cohen, I. Trevino, A. Hammer, M. Harris, J. Noble-Wang, B. Jensen, A. Peterson, J. Carr, M. Williams, M. Arduino, J. LiPuma, S. Gerber, A. Srinivasan

**Background:** *Burkholderia cepacia*-complex (BCC) organisms are gram-negative bacteria that cause serious respiratory infections in cystic fibrosis (CF) patients, frequently resulting in early death. BCC also causes healthcare-associated outbreaks, with mortality as high as 83%. To determine control measures, we investigated a cluster of BCC in ventilated, non-CF patients in a pediatric hospital.

**Methods:** Patient isolates were identified to the species level using *recA* species-specific PCR assays and *recA* restriction fragment length polymorphism analyses. We conducted a matched case-control study, staff surveys, and observations of infection control practices. Case-patients had respiratory infection or colonization with BCC. Control-patients had a negative respiratory culture for BCC. Based on epidemiologic observations and input from laboratory experts, we sampled suspect environmental surfaces. Patient and environmental isolates were compared by pulsed-field gel electrophoresis (PFGE).

**Results:** Respiratory isolates collected from 9 patients between July, 2005-June, 2006 belonged to a single BCC species, *B. cenocepacia*. Case-patients were more likely to have been mechanically ventilated  $\geq 7$  days ( $p=0.01$ ), hospitalized  $\geq 14$  days ( $p=0.04$ ), seen by a rehabilitation specialist ( $p=0.01$ ), and to have received  $\geq 3$  immunosuppressive agents ( $p=0.02$ ) than matched controls ( $n=27$ ). Multiple lapses in infection control were identified. Several different gram-negative bacteria were isolated from high-touch environmental surfaces. BCC was recovered from a ventilator temperature probe, humidification-chamber, filter, and tubing. BCC isolates from patients and ventilator components were indistinguishable by PFGE.

**Conclusion:** Molecular species identification and typing demonstrated that cases separated in time were likely part of an outbreak. Observed lapses in infection control led to targeted sampling and isolation of BCC from ventilator components and documentation of other environmental contamination. Findings led to changes in ventilator

management and infection control practices that terminated the outbreak.

**Keywords:** *Burkholderia cepacia* complex, disease outbreaks, mechanical ventilators, infection control, intensive care units, pediatric

**1:55 p.m.  
Emergence of Vancomycin-Resistant Enterococci in One Regional Health-Care Facility — North Dakota, 2006**

**Authors:** Dwayne W. Jarman, K. Kruger, A. Srinivasan, M. Jhung

**Background:** Vancomycin-resistant enterococci (VRE) infections are increasing nationwide; colonization pressure increases the risk for infection. VRE increases morbidity, mortality, and total costs associated with hospitalization. During 2006, the North Dakota Department of Health investigated a large VRE outbreak ( $>10$  times the cases reported state-wide during 2005), in a regional health-care facility (HCF-A) to identify risk factors and to prevent additional cases.

**Methods:** We performed a retrospective cohort study of all patients aged  $\geq 18$  years receiving VRE cultures at HCF-A during March–September 2006. We defined a case as at least one clinical- or surveillance-positive culture for VRE in a patient. We used multiple logistic regression to model the association between VRE-positive cultures and potential risk factors, including days hospitalized, age group, history of methicillin-resistant *Staphylococcus aureus* (MRSA) infection, kidney dialysis, and specific HCF-A ward exposure ( $\geq 1$  day).

**Results:** Of 1,304 patient specimen cultured, 131 (10.0%) were VRE-positive. Of these, 13 were clinical cultures indicating acute VRE infection. Vancomycin-resistant *Enterococcus faecium* was isolated in 108 cases, which included 12 clinical cases. Patients tended to be white (85.3%) and male (57.3%); the median age was 75 years (range=18–93 years). On multivariable analysis, days hospitalized (adjusted odds ratio [AOR]=1.1; 95% confidence interval [CI]=1.1–1.1), kidney dialysis (AOR=12.8; 95% CI=6.2–26.5), previous MRSA infection (AOR=10.6; 95% CI=4.7–23.7), and ambulatory surgical ward exposure (AOR=5.6; 95% CI=2.3–13.4) remained significantly associated with VRE.

**Conclusion:** Our investigation indicates VRE transmission occurred within the facility. VRE-positive patients can serve as a reservoir of future transmission among HCF-A patients. VRE infection-control practices in HCF-A should focus on the surgical ward, kidney dialysis room, and among patients with a previous history of MRSA.

**Keywords:** vancomycin resistant enterococci, VRE, antibiotic resistance, healthcare-associated infection, epidemiology

2:15 p.m.

### A Pseudo-Outbreak of *Mycobacterium abscessus* at a Healthcare Facility — Florida, 2006

**Authors:** David B. Blossom, K. Alelis, D. Chang, A. Flores, C. Perry, J. Gill, D. Beall, A. Peterson, B. Jensen, J. Noble-Wang, M. Williams, M. Yakrus, M. Arduino, A. Srinivasan

**Background:** *Mycobacterium abscessus* is a rapidly growing acid-fast bacillus that is a rare cause of human infection. In August 2006, CDC was notified that a hospital in Florida was experiencing an increased incidence of cultures growing *M. abscessus*, and we investigated the causes of this potential outbreak.

**Methods:** We reviewed the medical records of patients with a culture growing *M. abscessus* from January 1, 2005 through June 30, 2006 and observed medical procedures from which *M. abscessus* was frequently isolated. Environmental samples were collected. Isolates of *M. abscessus* from 12 randomly selected patients and the hospital environment were compared by pulsed-field gel electrophoresis (PFGE).

**Results:** Specimens from 143 patients grew *M. abscessus* from various anatomical sites including maxillary sinus (43%, 62/143), sputum (14%, 20/143), abscesses (14%, 20/143) and broncho-alveolar lavage (8%, 11/143). Few patients were perceived to have clinical infections. No procedure was significantly associated with recovery of *M. abscessus* and observations revealed no major breaches in infection control or in processing mycobacterial specimens in the laboratory. Isolates grew only after prolonged incubation (mean 45 days; SD 15 days) in unsealed Middlebrook 7H10 or Lowenstein-Jensen agar tubes. Isolates from the 12 patients were genetically indistinguishable by PFGE. Several environmental cultures, including a tube of uninoculated Middlebrook 7H10 agar prepared by the manufacturer, grew *M. abscessus* that matched the patient isolates. Although the source was never confirmed, cases decreased to baseline after the hospital followed recommendations to clean the incubator and seal culture tubes.

**Conclusion:** Our investigation suggests that this was a pseudo-outbreak of *M. abscessus* due to contamination of mycobacterial cultures during incubation. Adherence to recommended disinfection and laboratory protocols may have prevented this pseudo-outbreak.

**Keywords:** mycobacterium, outbreaks, contamination, pulsed-field gel electrophoresis

2:35 p.m.

### *Listeria monocytogenes* in Donated Platelets — United States, 2005

**Authors:** Manoj P. Menon, L. Graves, K. McCombs, M. Arduino, M. Kuehnert, M. Lynch

**Background:** Among blood components, platelets are particularly vulnerable to bacterial contamination, resulting in approximately 1 episode of sepsis or death per 100,000 transfusions. Following guidelines from the American Association of Blood Banks, member blood collection facilities and hospital transfusion services began screening platelets for bacteria in 2004.

In October 2005, CDC learned of four *Listeria monocytogenes* (Lm) isolates cultured from four platelet donations. Lm can cause listeriosis, a potentially lethal illness. Since transfusion-related listeriosis has not been documented, these findings raised concern about a common source.

**Methods:** We reviewed donors' clinical histories and donation records from each collection facility, and conducted an environmental investigation at one facility. Platelet Lm isolates were subtyped by pulsed-field gel electrophoresis (PFGE) and compared with clinical isolates in the CDC PFGE national database for Lm. Transfusion and food histories were obtained for all PFGE-related listeriosis cases reported in 2005.

**Results:** The four isolates of Lm were from platelets collected between September and October, 2005 at three separate facilities. All donors were asymptomatic at the time of donation. These platelets were not released for transfusion. No blood collection materials from common lots were identified. The platelet Lm isolates had four different PFGE patterns. Two of these PFGE patterns were indistinguishable from isolates obtained in 2005 from patients with listeriosis in multiple states. No common exposures among donors and patients were identified.

**Conclusion:** The source of platelet contamination was not identified. Asymptomatic bacteremia among donors was the likely source, indicating a higher frequency of infection with Lm, in otherwise healthy persons, than previously recognized. This investigation underscores the value of screening for platelet bacterial contaminants: four transfusion-related Lm infections likely were averted.

**Keywords:** *Listeria monocytogenes*, plateletpheresis, platelet transfusion, bacteremia

2:55 p.m.

**Risk of Infection Due to Improperly Cleaned Instrument for Prostate Cancer Biopsies — Maine, 2006**

**Authors:** Fernanda C. Lessa, S. Tak, S. DeVader, R. Goswami, M. Anderson, I. Williams, K. Gensheimer, A. Srinivasan

**Background:** In the United States, 640,000 prostate biopsies are performed annually. Risks of pathogen transmission from improperly cleaned instruments used for prostate biopsy are unknown. After hospital A discovered a lapse in its cleaning procedures for the single prostate biopsy instrument used at the hospital, an investigation was initiated to assess transmission of human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and bacteria during prostate biopsies.

**Methods:** Patients who underwent prostate biopsies from January 2003 to January 2006 at hospital A were identified and offered testing for HIV, HBV, and HCV infection. Cases of HIV, HBV and HCV infection were defined as positive serology post-biopsy without evidence of prior infection. Cases of bacterial infection were defined as a positive bacterial culture or at least two clinical symptoms of infection (fever, chills, pain, dysuria)  $\leq 14$  days post-biopsy. Cleaning procedures of biopsy instrument were reviewed.

**Results:** Of 528 patients identified, 8 were infectious for HBV or HCV at the time of biopsy. Among the 520 other patients, 402 (77%) were tested for HIV, HBV, and HCV. Fifteen (4%) patients had serological evidence of past HBV infection without recognized risk factors; they were not clustered in time around each other or after a patient with known infection. None tested positive for HIV or HCV infection. Eleven (2%) cases of bacterial infection were identified; no temporal clustering was observed among them. Manufacturer recommended brushes to clean the instrument lumen were never used.

**Conclusion:** Despite lack of evidence of pathogen transmission in this investigation, it is critical to review manufacturers' cleaning recommendations and to establish appropriate procedures to avert potential pathogen transmission and subsequent patient concerns.

**Keywords:** prostate, biopsy, blood-borne pathogens, infection, instruments

3:15 p.m.

**Epidemiologic Investigation of *Trypanosoma cruzi* Infection in Two Heart-Transplant Recipients — Los Angeles, California, 2006: Policy and Testing Implications**

**Authors:** Heather Kun, A. Moore, L. Mascola, B. Kubak, S. Radhakrishna, F. Steurer, G. Lawrence, D. Leiby, T. Mone, R. Hunter, M. Kuehnert

**Background:** Only one report exists of transplant-transmitted *Trypanosoma cruzi* (TC) infection in the United States. Risk for transplant-transmitted infection is unknown. However, no screening test is licensed for blood, solid-organ, or tissue donors, and diagnosis of acute TC is difficult. This might represent a risk for immunocompromised organ recipients. In February 2006, two Los Angeles heart transplant recipients experienced acute trypanosomiasis. The etiology of their infection is important for screening, diagnostic, and treatment recommendations.

**Methods:** Organ procurement and transplantation records were reviewed. Tissues from the two organ donors were examined by using polymerase chain reaction (PCR) and immunohistochemical staining; their sera were tested by immunofluorescence assay (IFA) and radioimmunoassay (RIA). Heart recipients were interviewed and screened for TC parasites by buffy coat exam, culture, and PCR. Nonheart-organ-recipients' whole blood and sera were tested by PCR and IFA. A traceback on blood products transfused to donors and recipients was conducted. Blood donors were tested by IFA and RIA.

**Results:** One organ donor was born in a TC-endemic region; the other was U.S.-born. Both organ donors tested positive for TC antibodies by RIA; one had a borderline positive IFA. Heart recipients had no risk factors for preexisting TC infection and were seronegative and PCR-positive, indicating recent infection. Nonheart-organ recipients tested negative. Blood products transfused to organ donors and heart transplant recipients tested negative.

**Conclusion:** Organ transplant was the likely source for TC infection in two heart recipients. Clinicians should be aware of this mode of transmission, and donor screening for TC should be considered. In December 2006, the FDA approved an assay for serologic screening; however no rapid test for organ screening exists.

**Keywords:** Chagas disease, tissue and organ procurement, blood transfusion, heart transplant

**Wednesday, April 18, 2007**  
**Session L: Field Epidemiology — Translating Science  
into Practice Around the World;**  
**International Night, Habersham Room**  
**7:30–9:35 p.m.**  
**Moderators: Murray Trostle and Roberto Flores**

**7:35 p.m.**

**Epidemic Chikungunya Fever, India and Indian Ocean,  
2006: Laboratory-Based Surveillance for Imported  
Cases, United States**

**Authors:** Eileen C. Farnon, A. J. Noga, R. Hochbein,  
O. L. Kosoy, J. J. Laven, R. S. Lanciotti, G. L. Campbell

**Background:** Chikungunya virus (CHIKV) is a mosquito-borne alphavirus endemic to Africa and Asia. Chikungunya fever (CHIKF) is characterized by fever, arthralgias, and sometimes arthritis; joint symptoms can be prolonged. In 2005-2006, an unprecedented outbreak of CHIKF occurred on islands in the Indian Ocean and in India. Viremic travelers from epidemic areas could introduce CHIKV to the United States through infection of competent local mosquito species. We investigated all cases of CHIKF confirmed at CDC in 2006 among travelers.

**Methods:** The CDC arboviral reference laboratory confirms CHIKF in travelers using serology (IgM, IgG, and neutralizing antibody), viral culture, and PCR. We searched the laboratory's database for all patients with laboratory-confirmed CHIKF with onset in 2006, and abstracted demographic and travel information.

**Results:** Thirty-one people from 14 states had laboratory evidence of recent CHIKV infection. Their median age was 51 years (range, 22-78 years); 53% were male. India was the travel destination most frequently reported (94%), followed by Réunion (3%) and Zimbabwe (3%). Evidence of recent infection was found by serology in 77%, by viral culture and PCR in 16%, and by PCR alone in 7%. In contrast, only 10 CHIKF cases were diagnosed at CDC during 1991-2005.

**Conclusion:** An unprecedented number of CHIKF cases were confirmed at CDC in 2006. The 5 culture-positive travelers, and others who might have had undetected viremia, posed a risk of introducing CHIKV into local mosquito populations. Travelers to tropical areas of Asia and Africa should take precautions against mosquito bites. Travelers returning from epidemic or endemic areas with fever and joint symptoms should be tested for CHIKV infection, and positive cases reported promptly to local public health authorities.

**Keywords:** chikungunya virus; arboviruses

**7:55 p.m.**

**Large Outbreak of Measles in North Rhine-Westphalia,  
Germany, 2006**

**Authors:** Ole Wichmann, A. Siedler, D. Sagebiel,  
S. Santibanez, A. Mankertz, A. Ahlemeyer, G. Vogt,  
U. van Treeck, G. Krause, W. Hellenbrand

**Background:** In 2006, a large measles outbreak (n=1,720) occurred in the German federal state of North Rhine-Westphalia with 60% of patients aged  $\geq 10$  years. An investigation was launched in the most seriously affected city of Duisburg to assess vaccination coverage (VC), vaccine effectiveness (VE), and disease burden.

**Methods:** Case-patients were Duisburg residents with exanthem ( $\geq 3$  days), fever, and either cough, coryza, or conjunctivitis occurring in 2006. We interviewed case-patients with a standardized questionnaire, and genotyping was performed on available samples. In addition, a retrospective cohort-study was undertaken at a public school affected by the outbreak. We distributed questionnaires to all 1,250 students aged 10–21 years, and abstracted vaccination records.

**Results:** A total of 594 patients with measles were notified from Duisburg (incidence 117.8/100,000 inhabitants), of whom 499 (84%) were interviewed. Of these, 8% were  $< 1$  year and 52%  $> 9$  years of age. 25% reported having received one dose of measles-containing vaccine (MCV), and 7% two doses. Measles-associated complications were otitis media (17%), pneumonia (5%) and encephalitis (0.4%); 15% required hospitalization. Genotyping revealed measles-genotype D6 in all 34 patients tested. In the school, 1,098 (88%) questionnaires were returned and vaccination records abstracted from 859 students (69%): 820 (95%) had received at least one, 605 (70%) two, and 39 (5%) no MCV-dose(s). We identified 53 case-patients. The attack-rate was 50% in unvaccinated students and  $< 1\%$  in those with 1–2 MCV-doses. VE was 98.1% in students with one and 99.4% with two MCV-doses.

**Conclusion:** VE was high. VC was, however, insufficient to prevent the outbreak. To prevent further outbreaks and to achieve the goal of measles elimination in Germany, VC must be increased, e.g. through school-based catch-up campaigns among adolescents.

**8:15 p.m.**

**An Outbreak Investigation of Leptospirosis —  
Fayezabad District, Tajikistan, April 14–22, 2006**

**Authors:** Matluba K. Dehkanova, S. Ajeilat, M. Favorov

**Background:** From March 17- April 10, 2006, 100 suspected cases of Leptospirosis were hospitalized in Fayezabad District, Tajikistan; all patients lived in seven neighboring villages. A case-control study was conducted April 14-22 to identify the disease vehicle of transmission.

**Methods:** A case was defined as a patient who, during March-April 2006, developed two of the following signs: fever >38.0°C, jaundice, enlarged liver, skin rash; and had positive blood microscopy for *Leptospira*. Cases were identified through routine surveillance and house-to-house search. Controls were randomly selected from residents in the seven villages (n=6098). Clinical and epidemiologic data were collected and blood microscopy of patients was performed. Water supply to the area was inspected. Logistic regression was used to study associations between exposure variables and disease.

**Results:** 125 cases with positive microscopy and 94 controls were enrolled. The epidemic curve was suggestive of a point source outbreak. 122 (98%) of the cases used piped water; only 14 (11%) boiled water before use, and 43 (34%) had a cat or a donkey. In multivariate analysis, boiling water before use was protective (OR=0.14; 95% CI=0.06-0.3). Using piped water (OR=12.0; 95% CI=2.2-64.6), having a cat (OR=5.0, 95% CI=2.1-12.0), and having a donkey (OR=2.8; 95% CI=1.3-6.1) were associated with increased disease risk. The villages received water supply from one pipe, it was damaged in Feb 2006 and was exposed to animals. Two water samples taken from the pipe below the damaged pipe section tested positive for *Leptospira*.

**Conclusion:** This investigation implicates piped water as the main vehicle for disease transmission. Home animals might have contributed to disease transmission and served as the source for contamination. Alternative water source was provided to the villages; residents were advised to boil water before use

**Keywords:** leptospirosis outbreak, piped water, home animals, disease transmission, Tajikistan

**8:35 p.m.**

**Outbreak of Methanol Poisoning in Leon, Nicaragua,  
September 2006**

**Authors:** S. Pérez, J. Rocha, L. Callejas, G.I. Suárez-Rangel

**Background:** Suspicious cases of methanol intoxication were reported on September 2, 2006 in PoneLOYA, Leon. An investigation was initiated to confirm the diagnosis, describe the cases, identify risk factors, sources and route of intoxication in order to prevent additional cases.

**Methods:** Case series study. A case was a patient who presented with one of the following symptoms: blurry vision, headache, neurological or gastrointestinal disturbance, with a history of having ingested liquor during September 2-18, and was seen at one of the health centers in Leon. Cases were interviewed, physically examined, and medical records reviewed. Blood samples and suspicious liquor were analyzed for ethanol and methanol using gas chromatography.

**Results:** Of 742 cases identified, 140 (19%) had blood samples taken and all were positive for methanol (range of concentration: 0.1-3 g/L). Among 41 patients who died (case fatality rate of 5.5%) the methanol concentration mean was 0.3 g/L (range: 0.03 to 3 g/L). Ten (24%) of the fatalities received no medical attention. Mean age was 36 years (range 12-84) and 724 (98%) were male. Mean age was significantly greater in those that died vs. those that survived (p=0.002). Eleven cases were blinded. All cases had ingested liquor "X", supplied in recycled liquor containers, and consumed at various establishments. Ten samples of confiscated liquor had a mean methanol concentration of 163 g/L (range: 0.06-380.8 g/L).

**Conclusion:** This outbreak was caused by the consumption of alcohol adulterated with methanol. The community was alerted and all samples identified of liquor X were confiscated. Health personnel were trained in the protocol for managing methanol poisoning. Civil Defense personnel were mobilized and a ministerial resolution was passed prohibiting the sale and distribution of unbottled alcohol.

**Keywords:** intoxication, methanol, ethanol, adulterated alcohol

8:55 p.m.

**Laboratory Investigation of an Outbreak of Cholera in Accra Metropolis, Accra, Ghana — May 2006**

**Authors:** Dramani E. Kwesi, A. Lawson, A. Simon, A. Edwin

**Background:** Cholera caused by *Vibrio cholerae* is a major public health problem in most developing countries. On 14 April 2006 an outbreak of acute watery diarrhea was reported in the Ablekuma sub-metropolis. By 20 May 2006, the outbreak had spread throughout the metropolis. We conducted an investigation to identify the causal pathogen, the source of the outbreak and preventable risk factors.

**Methods:** A suspected case of cholera was defined as a patient  $\geq 2$  years old with more than 3 watery stools per day. Rectal swabs were collected from patients for bacterial culture, and water samples from different sources were collected for culture and water analysis. Demographic information and exposure history were gathered through patient interviews and hospital records review using standardized questionnaires. Ninety rectal swabs from patients were collected. For the case-control study 2 controls, matched to cases by age-group and neighborhood, were randomly selected for each of these 90 cases.

**Results:** There were 136 cases and 6 deaths (Case fatality rate of 4.4%) between 14 April and 20 May 2006. *Vibrio cholerae* (serotype Ogawa) was isolated from 82 (91.1%) rectal swabs from 90 patients and also isolated from a pond near the Korle-gonno beach. The case-control study showed that contact with the pond was associated with illness (OR=59.5; 95% CI=24.9-146.6).

**Conclusion:** The diarrheal outbreak in the metropolis was caused by *Vibrio cholerae* (serotype Ogawa). The pond near the beach was the most likely source of the outbreak. Control measures included education campaigns on cholera prevention and chlorination of the pond. As a result of our investigation, the pond was chlorinated and the fishermen along the beach were educated.

**Keywords:** cholera, outbreak, Korle-gonno, Accra, Ghana

9:15

***Mycobacterium abscessus* Post-Injection Abscesses from Extrinsic Contamination of Multi-Dose Bottles of Normal Saline — Guangdong, China, December 2006**

**Authors:** Jun Yuan, Y. Liu, Z. Yang, Y. Cai, P. Qin, Z. Dong, T. Li, Z. Yan, D. Zhou, H. Luo, R. Fontaine, H. Ma

**Background:** In December, 2006, we received a request to investigate why abscesses had developed after injections at a rural clinic in Guangdong province, China. Acid fast bacilli (AFB) were identified from four of five abscesses. To develop control measures, we began an investigation to identify the method of acquiring and cause of these abscesses.

**Methods:** A case was an abscess or persistent induration at the site of an injection given since June 1, 2006. We identified all intramuscular (IM), and intravenous injections given at the clinic from August through October and compared case rates by route, medication, and diluents. We reviewed procedures in the injection room and took environmental cultures for mycobacteria.

**Results:** From October through December, 5.1% (31) of 602 persons who received injections developed a case. We identified the four AFB as *Mycobacterium abscessus*. All 31 cases (rate = 17%) occurred in 182 patients who had IM injections with four different medications dissolved in normal saline (NS) (risk ratio [RR] =  $\infty$ ;  $p < 0.0001$ ). The RR for individual IM medications ranged from 0.89 to 1.45 and the 95% CI all included 1.0. Fifteen case-persons with only single NS-containing injections were exposed from  $\geq 9$  multidose bottles. An open 16-gauge needle was routinely left through the septum of the bottle. We identified rapidly growing AFB in the water supplying the tap in the injection room. We found no cases from three clinics using NS diluent from the same manufacturer.

**Conclusion:** *M. abscessus*, an organism that multiplies in water, caused these abscesses through extrinsic contamination of multi-dose bottles of NS diluent. We trained and required staff to follow correct technique from official guidelines.

**Keywords:** *Mycobacterium chelonae*, hospital infection, disease outbreaks, abscess

## International Night Poster Session

### Poster 1 Hepatitis E Outbreak Investigation, Wau County, Western Bahr El Ghazal State, Southern Sudan, 2006

**Authors:** Lucia W. Kur, K. Sergon, N. Atem, C. Mounir, M. Muita

**Background:** Hepatitis E is an epidemic prone, severe viral disease; its fulminant form attacks with reported mortality rates ranging up to 4% in the general population and 20% in pregnant women. Following reported increased numbers of patients with acute jaundice in Wau County of Southern Sudan in August 2006, an investigation was conducted to confirm the diagnosis, to determine the magnitude of the outbreak, to identify possible risk factors, and to recommend control and preventive measures.

**Methods:** A suspect case was defined as any patient from Western Bar El Ghazal State presenting at a health facility after February 2006 with yellow eyes with no known chronic liver disease or other obvious cause. Suspected cases were detected through active case finding conducted at health facilities. Blood samples were collected in July and August from 22 patients and were tested for anti-Hepatitis E Virus IgM and Hepatitis E RNA detection. Health records were reviewed, and patients and key informants were interviewed using a standard questionnaire.

**Results:** Sixteen (73%) of the 22 specimens were positive for anti-HEV IgM. Of 516 patients meeting the case definition there were 16 deaths including 2 pregnant women. The overall case-fatality rate was three percent. The epidemic started in February and peaked in July. Three hundred ninety two (76%) were between 5 and 44 years of age, 263 (51%) were female, and 475 (92%) were from Wau South Payam. Three hundred thirty five (65%) drank water from open shallow wells, 98 (19%) from deep boreholes and 83 (16%) from rivers.

**Conclusion:** Young and middle age adults were the most affected age group. We suspect that contaminated open shallow wells may have contributed to the spread of Hepatitis E in Wau South Payam. These wells draw water from the same level as the water in pit latrines. Community health education was implemented with focus on water treatment through boiling and chlorination. Also, increased provision of clean water supply to the general population was advocated for.

**Keywords:** hepatitis E outbreak investigation, Wau, Southern Sudan.

### Poster 2 An Outbreak of Norovirus Gastroenteritis Attributed to Contact, an Unsafe Water Supply, and Flies in a Remote Village — Guangdong Province, China, 2006

**Authors:** Wenti Xu, L. Li, H. Zheng, J. Zhang, Z. Wang, H. Xiao, H. Mai, H. Luo

**Background:** On October 25, 2006, the Chinese emergency surveillance system revealed 29 diarrhea cases from a remote village. To identify the pathogen, mode of transmission, and develop control measures, we investigated this outbreak.

**Methods:** We defined a case as vomiting or diarrhea with onset from October 18 to 26, 2006, in a villager. We determined symptoms and exposures to other case-patients, food exposed to flies, and drinking water for all 167 villagers using a questionnaire of all families. We compared attack rates by exposure in a retrospective cohort design. We assessed quality of two village water supplies.

**Results:** From October 18 to 26, 34 (20%) of 167 villagers developed a case. Norovirus antigen was detected from two of three stool specimens, and one of eight rectal swabs. Twenty-four (53%) of 45 villagers with contact with a case also developed a case compared to 10 (8.2%) of 122 other villagers (risk ratio [RR] = 6.5; 95% confidence interval [CI] 3.4-12). The RR increased 3-fold as exposure to the feces or vomit increased from unexposed to >1 meter to  $\leq 1$  meters ( $P < 0.0001$ ;  $X^2$  for trend). Eating food exposed to flies was also a risk factor (RR=4.6; 95% CI 1.8-12). Drinking water from one supply was associated with the diarrhea (RR=2.7; 95% CI 1.5-4.9). This supply was unprotected from surface run-off in an orchard where villagers worked and the water was not chlorinated. Tap water from this supply had 240 Escherichia coli per 100 mL.

**Conclusion:** This norovirus gastroenteritis outbreak resulted from person-to-person transmission, an unsafe water supply, and contamination of food by flies. The village isolated the patients, killed the flies, and improved and chlorinated the water supply.

**Keywords:** gastroenteritis, disease outbreaks, norovirus, cohort study

### Poster 3

#### An Epidemic of Paratyphoid Fever Attributed to Inadequately Cooked Bivalve Mollusks, Fujian Province, China, 2006

**Authors:** Bo Yi, H. Ma, Y. Li, J. Tian, R. Fontaine, J. Sheng, W. Chen, C. Chen

**Background:** In China, paratyphoid fever (PTF) causes up to 120,000 reported illness yearly. In May 2006, we detected a >3-fold increase in PTF from a coastal city in Fujian Province, China. To identify the mode of transmission and develop control measures, we investigated this outbreak.

**Methods:** We defined PTF as fever ( $\geq 38.0$  C) lasting  $\geq 3$  days with *Salmonella paratyphi A* isolated from blood. We compared exposures of 34 PTF-persons to 34 control-persons hospitalized for injuries in the same hospitals. In a second case-control study we telephoned 47 PTF and 148 control-persons selected randomly by telephone numbers. We questioned them about eating shellfish and cold foods at restaurants. We evaluated cooking temperatures in two restaurants. We inspected two shellfish harvesting areas.

**Results:** From January through July, 108 PTF (attack rate 4.5/105) were reported. In the first case-control study, 71% of PTF-persons had dined in restaurants compared with 29% of control-persons during a two-week period (odds ratio [OR] = 5.7, 95% CI = 2.0 ~ 16). In the second case-control study, 55% of case-persons ate bivalve mollusks compared with 35% of the control-persons (OR = 2.4, 95% CI = 1.2 ~ 4.6). The OR for eating bivalve mollusks increased from 1.3 for eating them <7 times/month to 9.2 for  $\geq 7$  times/month ( $p < 0.01$ ,  $X^2$  for trend). Two evaluated restaurants cooked bivalve mollusks <3 minutes to internal temperatures of 65 to 72C. We found sewage overflow at one of the beaches where shellfish were harvested.

**Conclusion:** This outbreak was caused by eating inadequately cooked bivalve mollusks that were harvested from polluted beaches. Accordingly, the city prohibited harvesting shellfish from all shellfish beaches surrounding the city.

**Keywords:** paratyphoid fever, *Salmonella paratyphi A*, bivalvia, shellfish, disease outbreaks, case-control studies.

### Poster 4

#### Rotavirus Transmission Through a Hospital Outpatient Department, China — October–November 2006

**Authors:** Yuan Li, W. Xu, R. Fontaine, H. Ma, J. Cai, T. Wu

**Background:** In November, 2006, surveillance of laboratory-confirmed rotavirus diarrhea (RVD) in a large city showed a large increase in one district since October and in comparison to 2005. We began an investigation to identify key methods of exposure and transmission in order to develop control measures.

**Methods:** We defined a case of RVD as onset of vomiting or watery diarrhea since October 1, 2006, with rotavirus detected stool from a resident of the district. In the sub-district with the highest incidence rate, we selected 86 children aged  $\leq$  two-years-old who had RVD and compared their exposures to 98 control- children who had no gastrointestinal disease since October 1, 2006. We compared exposures of RVD-children for one to three days before onset to those of control-children for a comparable three-day period.

**Results:** From October 1 to December 10, 2006, 496 RVD were detected in the district. Ages ranged from 27 days to 44 years (median = 11 months). In the case-control study 31% of RVD-children had contact with a child with gastroenteritis compared to 5% of control-children (odds ratio [OR]=8.5; 95% confidence interval [95%CI]=2.9-27). Caregivers washed hands before feeding 60% of RVD-children and 81% of control-children.(OR=0.4; 95%CI=0.2-0.8). 23% of RVD-children and 4% of control-children had visited one hospital outpatient department for consultation for other conditions (OR=7.1; 95%CI=2.2-26), and staff there failed to promptly clean-up after vomiting accidents. Other hospitals (3) were not associated with RVD.

**Conclusion:** In addition to usual transmission through community contact, RVD was spread through the outpatient department of one hospital. We recommended that the hospital establish a separate treatment room for acute gastroenteritis and train staff to decontaminate the clinic after vomiting and diarrhea accidents.

**Keywords:** rotavirus, diarrhea, disease outbreaks

## Poster 5

### A Cholera Outbreak Response After a Major Disaster — Albay, Philippines, 2006

**Authors:** Joselito R. Feliciano, E. Mayor, A. Daluro, V. Roque, J. Pabellon, G. Samonte, N. Orosco, J. Lopez, E. Tayag

**Background:** On November 30, 2006 Super Typhoon “Durian” hit Bicol Peninsula, 500 kilometers from Manila. This caused floods and mudflows from Mayon volcanic debris that destroyed the water supply, power, communications and basic health-care services. Increasing diarrhea cases were reported by the Regional Epidemiology and Surveillance Unit. The National Epidemiology Center conducted an investigation. The objectives were to determine the existence of an outbreak, to determine the source, mode of transmission, identify the risk factors and to recommend prevention and control measures.

**Methods:** A matched case-control study was done in the village with the highest attack rate. A case was defined as a resident of the village, who experienced at least three episodes of painless watery stools per day anytime from December 1-12, 2006. A control was a well resident of the nearest unaffected household of same age and sex as the case. Rectal swabs were obtained from cases and controls. Drinking water sources were tested using PHC media. Key informants interview and environmental survey conducted.

**Results:** There were 112 cases from December 1-12, 2006 in Legaspi City. The case-control included 30 cases and 60 controls. Four rectal swabs (13%) were positive for *V. Cholera*. Univariate analysis revealed that using deep well water for drinking (OR 11.50; 95% CI=2.54-66.21) and for washing food (OR 6.50; 95% CI=1.95-54.22) were risk factors. Forty three percent of water samples were positive for coliforms.

**Conclusion:** There was a waterborne Cholera outbreak in Legaspi City. Good surveillance system led to early detection of an outbreak that could have become another disaster. Authorities provided safe drinking water; intensive IEC was conducted. Rehabilitation of the water sources was done by the local government.

## Poster 6

### *Salmonella* Kottbus Outbreak in Infant Caused by Bottled Water in Gran Canaria Island (Spain)

**Authors:** Rocío Palmera, P. García, A. García, A. Barrasa, D. Herrera

**Background:** Since October 2006, National Reference Laboratory reported a series of isolated of *Salmonella* Kottbus from Gran Canaria Island. The majority were in younger than 1 year and needed hospitalisation, although there were no case-fatality. As outbreaks due this *Salmonella* type are rare in literature and there was an important social alarm, an epidemiological study was conducted to describe the case characteristics and to determine the possible source of infection.

**Methods:** During October-November 2006, a matched case-control (1:2) studies was conducted. Case was defined as infant less than 1 year with gastroenteritis and with laboratory confirmed *Salmonella* kottbus. Controls were obtained from the same General Practitioner than cases and were matched on age, sex, date of consultation and address. Parents were interviewed on food and drinks consumption. Conditional logistic regression Odds Ratios (OR) were calculated to identify risk factors. Microbiological and environmental analysis were also conducted.

**Results:** 42 cases were identified, 26 (62%) male, with a mean age of 6.2 month (CI 95% 5.7-6.8). 19 cases (45%) presented any underlying disease or immunocompromised status. Cases occurred in the whole island and distributed following the main highway from west to east and all consumed bottled water. An association was detected with the consumption of a locally produced bottled water (OR=5.71, CI95% 1.40-23.17). Microbiological and environmental analysis detected *Salmonella* kottbus in bottles selected from markets and in the local factory.

**Conclusion:** This study confirms an outbreak associated with a commercial water and is the first one detected in Spain. The presence of underlying diseases in half of cases may have contributed to the occurrence of this outbreak. As a consequence of this results the factory was closed down.

**Keywords:** outbreak, *Salmonella* Kottbus, infants

#### Poster 7

### A Case-Control Study To Identify Risk Factors for Typhoid in Darjeeling, West Bengal, India, 2005–2006: Evidence for Practical Action

**Authors:** Puran K. Sharma, R. Ramakrishnan, Y. Hutin, A.K.Barui, P. Manickam, M.D. Gupte

**Background:** Typhoid, caused by *Salmonella typhi*, is endemic in Darjeeling. We conducted a case-control study to identify risk factors and propose prevention measures.

**Methods:** We recruited typhoid cases in the hospital defined as fever  $>38^{\circ}\text{C}$  for  $\geq 3$  days with four-fold rise in 'O' antibodies on paired sera (Widal). We recruited community, age and neighbourhood matched controls. We collected information regarding sources, storage and use of drinking water, consumption of fruits, raw vegetables and milk products and sanitation practices. We calculated matched odds ratios (MOR) and attributable fractions in the population (AFP) for the risk factors or failure to use prevention measures.

**Results:** The 123 typhoid cases (Median age: 25 years, 47 % female) and 123 controls did not differ with respect to baseline characteristics. Cases were less likely to store drinking water in narrow-mouthed containers, [MOR: 0.4, 95% CI: 0.2-0.7, AFP 29%], tip containers to draw water [MOR: 0.4, 95% CI: 0.2-0.7, AFP 33%] and have home latrines [MOR: 0.5, 95% CI: 0.3-0.8, AFP 23%]. Cases were more likely to consume butter [OR: 2.3, 95% CI: 1.3-4.1, AFP 28%], yoghurt [OR: 2.3, 95% C.I.: 1.4-3.7, AFP 34%] and raw fruits and vegetables, including onions [MOR: 2.1, 95% CI: 1.2-3.9, AFP 34%], cabbages [OR: 2.8, 95% CI: 1.7-4.8, AFP 44%] and unwashed guavas [OR: 1.9, 95% CI: 1.2-3, AFP 25%].

**Conclusion:** Typhoid was associated with unsafe water and sanitation practices as well as with consumption of milk products, fruits and vegetables. We propose to promote (1) chlorination of drinking water at the point of use, (2) washing / cooking of raw fruits and vegetables and (3) safer preparation / storage of local milk products.

**Keywords:** *Salmonella Typhi*, typhoid, hygiene, sanitation, safe drinking water

#### Poster 8

### Surveillance in the Public Sector Captures Only a Small Fraction of Measles Cases in Howrah District, West Bengal, India, 2005

**Authors:** Debasis Roy, M. Murhekar, Y. Hutin, M.D. Gupte

**Background:** Measles is often under-reported. In 2002, India reported only 51,780 measles cases despite 67% vaccine coverage. We evaluated the sensitivity of the measles surveillance in the Howrah district, West Bengal in 2005.

**Methods:** We defined measles cases as per WHO surveillance standards. We sampled 160 households with under-five children in each of 16 village clusters selected with probability proportional to size. We searched the 2,560 households sampled door-to-door to identify measles cases that had occurred under-five children between October 2004 and September 2005. We interviewed mothers about use of health care services during identified episodes. We calculated the proportion of cases seen in the public and private sectors. We reviewed surveillance records in all primary health care facilities and at the district level to estimate the proportion of cases seen in public health care facilities that had been reported to the district.

**Results:** We identified 240 measles cases in the 2,560 children of the 2,560 households (attack rate: 9.4%). Of these, eight (3.3%, 95% Confidence Interval [CI]=1.5-6.5) and 123 (51%, 95%CI= 45-58) were seen in public and private health care facilities, respectively. Of 980 cases identified in 448 public sector facilities in the district, 962 (98%) had been reported to the district.

**Conclusion:** Measles surveillance in public sector captured only a small minority of measles cases, but those cases captured were transmitted well to the district. Surveillance must engage the private sector. Health education focusing on the availability of vitamin A treatment for measles might provide an incentive to seek care, which could increase the sensitivity of surveillance.

**Keywords:** surveillance, sensitivity, health care facilities, measles

## Poster 9

### A Fulminating Food Poisoning Caused by *Bacillus cereus* in Village Kuhabaus of Bolangir District, Orissa, India, 2006

**Authors:** Manjubala Panda, V. Ramachandran, M.D. Gupte

**Background:** Outbreaks of *B. cereus* food poisoning often go unreported / misdiagnosed because of symptomatic similarities to *Staphylococcus aureus* intoxication or *Clostridium perfringens* food poisoning. On 28 September 2006, clustering of food poisoning cases at village Kuhabaus, district Bolangir, Orissa, India, were reported by the local health authority. We investigated the outbreak to identify the source and implement control and preventive measures.

**Methods:** We defined a case as occurrence of vomiting, abdominal cramp, semi-consciousness, with/ without fits in a resident of Kuhabaus from 7 AM to 7 PM on 28 September 2006. We performed descriptive epidemiology and conducted a case control study to identify risk factors. We recruited all cases and healthy neighbourhood controls. We collected data on symptoms, and various food items consumed during past 24 hours. We calculated odds ratio (OR) and 95% confidence intervals (CI). Samples of vomitus and suspected food materials were analysed

**Results:** Twelve cases were identified. Epidemic curve suggested a point source. Spot map showed clustering of cases in (majhipada) part of the village. Attack rates were more in children 0-13 years. Arisha and Khai were significantly associated with symptoms (Arisha: OR: 41.1, 95% CI: 4.3-405.3; Khai: OR: 7.2, 95% CI: 1.5-35.2), and showed extensive colonization of gram-positive organisms on culture. *Bacillus cereus* was isolated on phage typing. Vomitus from two case-patients were culture and gram stain negative.

**Conclusion:** Food poisoning outbreak due to *B. cereus* and consumption of stale (five days old) Arisha and Khai was confirmed. Villagers were advised to cook food adequately, practice hygienic food handling and consume freshly prepared food.

**Keywords:** outbreak, *B. cereus* food poisoning, consumption of contaminated rice cake

## Poster 10

### Persistence of Diphtheria in Hyderabad, the Capital of Andhra Pradesh State, India: Importance of Booster Doses

**Authors:** Sailaja Bitragunta, M. Murhekar, Y. Hutin, P. Padmanabha Prasad, M.D. Gupte

**Background:** Andhra Pradesh accounted for half of global diphtheria cases in 2005 and Hyderabad accounted for 16% of state cases. We conducted a study to understand whether diphtheria persisted because of vaccine failure or failure to vaccinate.

**Methods:** All diphtheria patients were referred to the Fever hospital. We described cases hospitalized during 2003-2006. We prospectively compared laboratory-confirmed cases aged 5 to 10 years with age and neighborhood matched controls to estimate vaccine efficacy. We surveyed children aged 12-23, 18-36 and 54-72 months to estimate coverage for primary vaccination, fourth (18 months) and fifth (54 months) diphtheria doses.

**Results:** During 2003-2006, 2,534 cases were admitted (annual rate: 16/100,000, case fatality: 1%, median age: 17 years). Rates were highest in children aged 10-14 years, women and a religious minority (28, 19 and 68/100,000, respectively). Four divisions of the city with large minorities accounted for 90% of cases. Cases occurred throughout the year with lower incidence in July-August. Primary vaccination was not protective. The fourth and fifth doses were 63% (95% confidence interval [CI]: 0.1-87) and 90% (95% CI: 63-97) efficacious, respectively. The coverage for primary vaccination, fourth and fifth doses were 90% (95% CI: 89-90), 60% (95% CI: 59-60) and 33% (95% CI: 33-34), respectively. Compared with others, minority members had a coverage that did not differ for primary vaccination but that was lower for the fourth and fifth doses (coverage ratio: 0.9, 95% CI: 0.8-1 and 0.6, 95% CI: 0.5-0.8, respectively).

**Conclusion:** Receiving booster doses was key for diphtheria protection. However, coverage dropped after primary vaccination, especially among a minority with high rates. We recommended increasing the booster doses coverage with an emphasis on minorities.

**Keywords:** diphtheria, vaccination coverage, vaccine efficacy

Thursday, April 19, 2007  
Session M: Holy Mackel!  
Mackel Award Finalists  
Grand Ballroom 8:30–10:15 a.m.  
Moderators: Tanja Popovic and Tom Shinnick

8:35 a.m.

**Community-Associated Methicillin-Resistant *Staphylococcus aureus* Among Personnel at a Pediatric Clinic — Tennessee, 2006**

**Authors:** L. Rand Carpenter, M. Kainer, A. Woron, S. Baker, W. Schaffner, T. Jones

**Background:** Ambulatory-care visits for skin and soft-tissue infections have increased dramatically in the United States, and community-associated (CA) methicillin-resistant *Staphylococcus aureus* (MRSA) is a frequent cause of these infections. Healthcare workers (HCWs) in outpatient settings can be at increased risk for MRSA infection. We investigated an outbreak of MRSA infections among personnel at a pediatric outpatient clinic.

**Methods:** Isolates from a clinic worker who died of MRSA sepsis were compared with MRSA isolates from staff nasal-swab cultures and clinic patient nasal swabs by using pulsed-field gel electrophoresis (PFGE). Clinic environmental samples were cultured to identify contamination by *S. aureus*. A questionnaire concerning hygiene and work practices was administered to personnel.

**Results:** We identified 16 skin and soft tissue infections in a 6 month period among 45 clinic staff with a completed questionnaire; three, including the deceased employee, had laboratory-confirmed MRSA. Nasal swabs indicated that 15/45 (33%) personnel were colonized with *S. aureus*, and 2/45 (4.4%) isolates were identified as MRSA. PFGE patterns of these two isolates were indistinguishable from the USA800 strain and did not match the pattern from the deceased employee's isolate (USA300). Among the sample of 262 patient swabs, 97 (37%) yielded *S. aureus*. Nine (3.4%) were identified as MRSA and represented a variety of PFGE patterns, with three indistinguishable from the USA300 strain. Of 71 environmental surfaces cultured, eight (11%) were contaminated with *S. aureus* (none were MRSA). The questionnaire indicated that standard precautions had been inconsistently applied when dealing with skin and soft-tissue infections among patients.

**Conclusion:** HCWs are increasingly exposed to persons with CA-MRSA. Standard precautions and environmental controls in outpatient settings are important methods of limiting HCW exposure.

**Keywords:** methicillin-resistant *Staphylococcus aureus*, colonization, health-care worker, skin infection

8:55 a.m.

**Multistate Outbreak of *Fusarium* Keratitis Associated with Use of a Contact Lens Solution — United States, 2005–2006**

**Authors:** Douglas C. Chang, G.B. Grant, K. O'Donnell, K.A. Wannemuehler, J. Noble-Wang, C.Y. Rao, L.M. Jacobson, C.S. Crowell, R.S. Sneed, F.M. Lewis, J.K. Schaffzin, M.A. Kainer, C.A. Genese, E.C. Alfonso, D.B. Jones, A. Srinivasan, S.K. Fridkin, B.J. Park for the *Fusarium* Keratitis Investigation Team

**Background:** *Fusarium* keratitis (FK), a sight-threatening fungal corneal infection that is usually preceded by ocular trauma, is rare among the 30 million contact lens wearers (CLW) in the U.S. In March 2006, we investigated an increase in FK among U.S. CLW.

**Methods:** We identified cases, defined as a culture-confirmed FK without recent ocular trauma and illness onset after June 1, 2005, by contacting large microbiology laboratories and by encouraging ophthalmologist reporting. A case-control study, limited to soft CLW, compared case-patients to neighborhood-matched controls and involved 45 cases and 78 controls. Environmental sampling (air, water, and dust) was conducted at a contact lens solution (CLS) manufacturing plant. Unopened CLS bottles and used contact lens paraphernalia from case-patients were cultured. *Fusarium* isolates were genotyped by multilocus sequence typing.

**Results:** We identified 164 cases from 33 U.S. states and one territory. Median age was 41 years (range, 12–83); soft contact lenses were worn by 154 (94%). Corneal transplantation was required in 55 (34%). Case-patients were more likely than controls to report recent use of ReNu with MoistureLoc (ML), a new CLS product (69% vs. 15%; matched OR, 13.3; 95% CI, 3.1–119.5). *Fusarium* was recovered from used CLS bottle-caps, but not from ML CLS filtrates or the ML manufacturing plant. Ten *Fusarium* species (19 genotypes) were identified, consistent with sink and shower drain colonizing flora. After ML was withdrawn and recalled in the U.S. and worldwide, case reports decreased.

**Conclusion:** This outbreak had substantial morbidity and was associated with ML use. The source of *Fusarium* was likely at the point of use; unique ML formula properties may have allowed *Fusarium* growth. Rapid public health action and the recall stopped the outbreak.

**Keywords:** *Fusarium*, keratitis, contact lenses, contact lens solutions, disease outbreaks

9:15 a.m.

### Human *Mycobacterium bovis* Tuberculosis — United States, 1995–2005

**Authors:** Michele C. Hlavsa, P. Moonan, L. Cowan, T. Navin, S. Kammerer, R. Pratt, J. Crawford, P. LoBue

**Background:** Human tuberculosis (TB) is an airborne disease when caused by *Mycobacterium tuberculosis*, but can be foodborne or airborne when caused by *Mycobacterium bovis*. Although the U.S. TB surveillance system does not distinguish between the two, CDC's National TB Genotyping Service (NTGS) characterizes *M. tuberculosis*-complex isolates (e.g., *M. tuberculosis* and *M. bovis*), which allows identification of species. Understanding the epidemiology of *M. bovis* TB is important because existing TB-control strategies focus on airborne transmission only.

**Methods:** After linking NTGS database records, which include results of spacer oligonucleotide and mycobacterial interspersed repetitive units typing, to corresponding records in the U.S. TB surveillance database, we compared the epidemiology of *M. bovis* and *M. tuberculosis* TB.

**Results:** Of 17,647 NTGS records, we linked 10,987 (62.3%) to TB surveillance records. We identified 165 (1.5%) *M. bovis* TB patients. Of these, 77 (46.7%) had extrapulmonary disease, 147 (89.1%) were Hispanic, and 116 (70.3%) were foreign born, including 101 (87.1%) native Mexicans. In bivariate analyses, *M. bovis* and *M. tuberculosis* TB patients significantly ( $p < 0.05$ ) differed in disease site, race/ethnicity, nativity, age, sex, and HIV status. We then included these factors in multivariate analysis, where *M. bovis* TB patients were more likely to have extrapulmonary disease (adjusted odds ratio [aOR]=8.2, 95% confidence interval [CI]=5.5–12.2), to be Hispanic (aOR=24.7, 95% CI=14.0–43.5), and to be <15 years of age (aOR=5.7, 95% CI=3.4–9.5).

**Conclusion:** Genotyping data enabled the first nationwide U.S. epidemiologic study of human *M. bovis* TB. Because of its distinct epidemiologic profile, we recommend routine surveillance utilizing NTGS data and studies to establish transmission dynamics to direct development of prevention strategies targeting Hispanics and the young.

**Keywords:** *Mycobacterium bovis*, tuberculosis, *Mycobacterium tuberculosis*, molecular epidemiology, prevention and control

9:35 a.m.

### Outbreak of Acute Renal Failure Syndrome Due to Diethylene Glycol Poisoning — Panama, 2006

**Authors:** E. Danielle Rentz, L. Lewis, O. Mujica, J. Schier, C. Rubin, M. McGeehin, D. Barr, J. Wamsley, J. Osterloh

**Background:** On September 20, 2006, a Panamanian physician reported an unusual number of patients with unexplained acute renal failure frequently associated with severe neurologic dysfunction. Twelve (57%) of twenty-one patients had died of the syndrome. CDC conducted case-control and laboratory investigations to determine the cause of illness and source of the outbreak.

**Methods:** After additional case-finding, case-patients (defined as having acute renal failure of unknown etiology and serum creatinine  $\geq 2$  mg/dl) were individually matched to hospitalized controls on age ( $\pm 5$  years), gender, and admission date ( $\leq 2$  days prior to case or anytime thereafter). Questionnaire and biological (blood and serum) data were collected and analyzed for toxic and infectious agents. Conditional logistic regression was used to estimate crude and adjusted odds ratios (AORs).

**Results:** Forty-two cases and 140 controls participated in the study. Median age of case-patients was 68 years (range: 25–91); 64% were male. Case-patients were more likely than controls to have ingested prescribed cough syrup (Odds Ratio [OR]=37.3; 95% Confidence Interval [CI]=8.8–157.7), been prescribed ACE inhibitors (OR=5.4; 95% CI=2.4–12.2), and reported pre-existing hypertension (OR=2.8; 95% CI=1.1–6.7) or renal disease (OR=2.5; 95% CI=1.0–6.0). Controlling for matched factors and ACE inhibitors, ingesting prescribed cough syrup was significantly associated with onset of the syndrome (AOR=32.9; 95% CI=7.4–146.8). Laboratory methods developed for this outbreak found a significant difference in diethylene glycol (DEG) in biological samples from case- and control-patients ( $p < 0.05$ ) and an 8% DEG contamination in cough syrup samples.

**Conclusion:** Epidemiological and laboratory data identified DEG-contaminated cough syrup as the source of the outbreak. This co-investigation led to a recall of approximately 30,000 bottles of contaminated cough syrup, widespread screening of potentially exposed consumers, and treatment for over 100 DEG-toxic patients.

**Keywords:** case-control, diethylene glycol, outbreak, Panama, renal

9:55 a.m.

**Epidemiologic and Molecular Investigation of an Outbreak of Hepatitis C Virus Infection at a Hemodialysis Unit — Richmond, Virginia, 2006**

**Authors:** Nicola D. Thompson, Y. Khudyakov, I. Williams, R. Novak, S. Ramachandran, G. Xia, L. Ganova-Raeva, S. Bialek, B. Bell, M. White-Russell.

**Background:** The hepatitis C virus (HCV) infection prevalence of hemodialysis (HD) patients (8-10%) is six times that of the general population (1.6%). HCV transmission in HD settings is associated with environmental contamination and failure to follow recommended infection control (IC) practices. We investigated a cluster of incident HCV infections in a HD unit to determine the source and mode of transmission, and develop transmission prevention recommendations.

**Methods:** We tested patients and staff, conducted a retrospective cohort study, and reviewed IC practices. Patients' HCV infection status (incident, chronic, or susceptible) was determined by results from testing on admission to the HD unit and in January and July, 2006. Genetic relatedness between infected patients was determined by analysis of the nonstructural coding (NS5b) and hypervariable (HVR1) regions of the HCV genome.

**Results:** Between January and July, 2006 seven (13%) of 52 susceptible patients were identified with incident infection. Twelve patients and two staff were chronically-infected. Six incident case-patients, seven chronic case-patients, and both staff were HCV genotype 1a. Phylogenetic analysis identified two distinct genetically-related clusters, each comprising one chronic and three incident case-patients; HCV-infected staff were not related. In one cluster, being on the same dialysis shift as a chronic patient was associated with infection [RR=38.8, 95% CI 22.5-66.9]. In the other, being on the dialysis shift following a chronic patient [RR=10.04, 95% CI 7.7-13.1] was associated with infection.

**Conclusion:** Joint epidemiologic and laboratory investigations indicate at least two separate events involving transmission from two chronically-infected patients. Different risk factors suggest distinct modes of transmission within each cluster. HD staff must maintain fastidious attention to aseptic technique and IC practices during and after dialysis of patients.

**Keywords:** epidemiology, outbreak, hemodialysis, hepatitis C virus, genotype, hypervariable region 1

Thursday, April 19, 2007  
Session N: Risky Business — Occupational  
Grand Ballroom 10:30 a.m.–12:00 p.m.  
Moderator: Boris Lushniak

10:35 a.m.

**Unintended Exposures to *Brucella* Species in Four Microbiology Laboratories — Colorado, 2006**

**Authors:** Wendy M. Bamberg, M. Evdemon-Hogan, J. Pape, K. Gershman

**Background:** *Brucella* species, zoonotic bacteria with worldwide distribution, are category B biologic terrorism agents because of their high potential for aerosolized transmission. Brucellosis is among the most common laboratory-associated infections, occurring by inhalation when appropriate precautions have not been taken. During July–August 2006, we investigated unintended exposures of laboratory personnel in four laboratories, resulting from three cases of culture-confirmed brucellosis reported within a 3-week period.

**Methods:** To identify a possible common source of infection, we interviewed patients; species identification of *Brucella* isolates was conducted at CDC. We interviewed laboratory microbiology staff about unprotected exposures to *Brucella* species and recommended antibiotic prophylaxis and serial serologic testing, depending on level of exposure.

**Results:** The three patient isolates were identified as *Brucella melitensis*, *B. abortus*, and *B. suis*. No epidemiologic links were identified among the patients. Forty microbiology technicians were interviewed at the four exposed laboratories. Eighteen (45%) reported having directly manipulated the organisms outside a biosafety cabinet, including two who had sniffed the culture plates. Ten others (25%) had been in the immediate vicinity during manipulation. Postexposure prophylaxis was recommended for these 28 workers. Nineteen (68%) agreed to take antibiotics, but three discontinued treatment because of side effects. Serial serologies were recommended for 35 (83%); at 3 months, 14 (40%) have been compliant. All workers remain seronegative and asymptomatic at 3 months postexposure.

**Conclusion:** The ongoing need for education of laboratory staff regarding appropriate precautions when working with suspected *Brucella* isolates is highlighted by this incident involving four laboratories. During this investigation, the timely institution of antibiotic prophylaxis might have prevented brucellosis among the most exposed laboratory workers.

**Keywords:** *Brucella*, brucellosis, exposure, laboratory, prophylaxis

**10:55 a.m.**

**Elevated Prevalence of Sarcoidosis and Respiratory Illness Among Workers in an Office Building — Vermont, 2006**

**Authors:** A. Scott Laney, L. Blevins, A. Sumner, L. Cragin, C. Lohff

**Background:** Sarcoidosis is a granulomatous disease of unknown etiology that can affect multiple organs. Annual incidence among U.S. whites is 11 cases/100,000 population. In June 2006, we investigated a possible sarcoidosis cluster among office workers in a building with a history of water incursion and indoor-air-quality complaints.

**Methods:** We interviewed building occupants with physician-diagnosed sarcoidosis, administered a health survey and pulmonary function tests (PFT) to all consenting occupants, and conducted visual inspection and environmental testing of the building. Prevalence ratios were compared to the Environmental Protection Agency's Building Assessment Survey and Evaluation study (BASE), a nationally representative survey of office buildings and their occupants.

**Results:** Six sarcoidosis cases were identified; three among 136 current occupants and three among 500 former occupants. Current building prevalence is 2,205 cases/100,000 population. Of current occupants, 77% (105) participated in the health survey and 64% (87) in PFT. Respiratory symptom reporting was high, with 20% (21/104) reporting physician-diagnosed asthma, 43% (45/104) shortness of breath, 40% (42/104) wheezing, and 49% (49/100) coughing attacks. Comparisons to BASE yielded elevated prevalence ratios (PR) for shortness of breath (PR=9.6; 95% confidence interval [CI]=6.1–15.2), wheeze (PR=9.1; 95% CI=5.6–14.6), and chest tightness (PR=5.1; 95% CI=2.8–9.0). PFT results were consistent with self-reported data. Environmental inspection revealed evidence of water damage and moderate to high levels of endotoxin and culturable fungi.

**Conclusion:** The investigation identified a high prevalence of sarcoidosis, asthma, and asthma-like symptoms among workers of a building with past water damage. On the basis of these findings, building occupants are being relocated while building diagnostics and remediation occur. Immunologic and genetic studies to further elucidate the natural history and etiology of sarcoidosis are planned.

**Keywords:** sarcoidosis, asthma, office workers, building-related symptoms, indoor environment

**11:15 a.m.**

**Risk of Occupational Transmission of Avian Influenza A (H5N1) Virus, Northern Nigeria, March 2006**

**Authors:** Justin R. Ortiz, M. Katz, M. Mahmoud, S. Ahmed, S. Bawa, M. Sarki, A. Nasidi, M. Ado, H. Yahaya, T. Joannis, E. Farnon, J. Achenbach, R. Breiman, J. Vertefeuille, J. Katz, T. Uyeki, S. Wali

**Background:** The unprecedented spread of avian influenza A (H5N1) among poultry poses an increasing influenza pandemic risk. Sporadic human H5N1 cases with high mortality have occurred after contact with diseased poultry infected with H5N1 virus. H5N1 was confirmed among poultry in February 2006. We conducted the first serologic survey in Africa to assess the occupational risk of H5N1 virus infection.

**Methods:** From March 28 through April 3, 2006, poultry workers (PWs) in Kano State, Nigeria who worked at a farm or market during a poultry outbreak that met the Ministry of Agriculture's case definition for suspected or confirmed H5N1 were invited to enroll. Participants were asked about types of poultry exposures from January through enrollment, medical history, and health care utilization. Serum collected from participants was tested for H5N1 antibodies by microneutralization assay.

**Results:** Among 295 PWs, the median age was 28 years (range 12 - 58), 275 (93%) were male, and 141 (48%) had secondary school education. PWs reported a median of 14 days of direct physical contact with suspected or confirmed H5N1-infected poultry. Most PWs (75%) reported that they would seek care at a hospital for worsening symptoms of influenza-like illness (ILI), but 52% reported that they would not always take gravely ill family members to a hospital. All participants tested negative for H5N1 antibodies.

**Conclusion:** Despite widespread exposure to poultry likely infected with H5N1 virus, no risk of H5N1 virus transmission was identified among survey participants during January to March, 2006. Additional sero-surveys will be useful to assess the risk of human H5N1 virus infection as the virus continues to evolve and to spread among poultry.

**Keywords:** influenza, human; influenza A virus, H5N1; influenza, human/diagnosis

**11:35 a.m.**  
**Sudden Cardiac Death Among On-Duty Firefighters**  
**— United States, 1998–2004**

**Authors:** Marilyn Ridenour, T. Hales

**Background:** From 1998-2004, 622 firefighters died (excluding firefighters at the World Trade Center on 9/11) while on-duty and 291 (47%) of those died from a sudden cardiac event. Two studies in 2003 reported increased prevalence of cardiovascular disease (CVD) risk factors among firefighters. The purpose of this study was to determine whether the proportion of CVD risk factors were increased among firefighters and if there were differences in proportions between volunteer and career firefighters who died of a cardiac event.

**Methods:** We reviewed case reports of 111 (37 volunteer and 74 career) firefighter cardiac fatalities investigated by NIOSH, and CVD risk factor information was abstracted.

**Results:** Among 37 volunteer firefighter fatalities investigated, 100% were male, 70% were >45 years old, 65% were overweight/obese, 54% had high cholesterol, 54% had hypertension, 54% were physically inactive, 38% had a family history of coronary artery disease (CAD), 30% were smokers, and 16% had diabetes mellitus (DM). Corresponding figures for 74 career firefighter fatalities were 100% male, 73% >45 years old, 46% overweight/obese, 58% high cholesterol, 46% hypertension, 38% physically inactive, 27% family history of CAD, 41% smokers, and 16% DM. The proportion of each CVD risk factor between volunteer and career firefighter fatalities was not significantly different.

**Conclusion:** The proportion of CVD risk factors was high for both volunteer and career firefighter fatalities; however volunteer firefighters had a higher proportion (although not statistically higher) for obesity, physical inactivity, and family history of CAD. Previous research has indicated that approximately 20% of fire departments do not adhere to established National Fire Protection Association guidelines for medical screening and fitness/wellness. Prevention efforts should focus on compliance to these established guidelines.

**Keywords:** firefighters, sudden cardiac death, cardiovascular disease risk factors

**Thursday, April 19, 2007**  
**Session O: Think Globally, Act Globally —**  
**International**  
**Presentation of the Paul C. Schnitker**  
**International Health Award**  
**Grand Ballroom 1:30–3:15 p.m.**  
**Moderator: Rob Quick**

**1:35 p.m.**  
**Access to Healthcare for Pneumonia in Santa Rosa,**  
**Guatemala**

**Authors:** Hannah T. Jordan, N. Padilla, W. Arvelo, O. Henao, L. Reyes, N. Pezzarossi, C. Friedman, K. Lindblade

**Background:** Pneumonia is a leading cause of death in Guatemala. Hospital-based pneumonia surveillance will be established in Santa Rosa (SR), Guatemala to measure disease incidence for prevention planning. We conducted a community healthcare utilization survey to estimate what proportion of pneumonia cases could be captured by hospital-based surveillance.

**Methods:** Trained interviewers administered standardized questionnaires to all members of 1,200 households in 60 villages selected by probability proportional to village size. We recorded healthcare sought for all reported episodes of probable pneumonia (defined as cough and dyspnea for  $\geq 2$  days or physician-diagnosed pneumonia) in the preceding year. Severe illness was defined as cough and dyspnea plus cyanosis, confusion, convulsions, loss of consciousness, or death. Proportions were calculated using SAS.

**Results:** Of 5356 individuals surveyed, 327 (6%) met the definition of probable pneumonia. Probable pneumonia was most common in persons aged <5 and  $\geq 65$  years, occurring in 10% of each of these age groups. Overall, 257 (79%) persons sought some form of healthcare outside the home. Persons from wealthier households were more likely to seek care outside the home than persons from poorer households (86% vs. 73%,  $p=0.01$ ). Of those seeking care outside the home, 30 (12%) visited a SR hospital. Children <5 years were more likely to be brought to a SR hospital than persons  $\geq 5$  years old (17% vs. 8%,  $p=0.02$ ). Severely ill persons ( $n=59$ ) were more likely to seek care at a SR hospital than persons with milder illness (19% vs. 7%,  $p=0.005$ ).

**Conclusion:** Twelve percent of persons with probable pneumonia sought care at a SR hospital. Hospital-based surveillance is likely to underestimate the burden of pneumonia in this area.

**Keywords:** pneumonia, community survey, Guatemala, surveillance

1:55 p.m.

**Prevalence of Lymphatic Filariasis in American Samoa After Three Years of Improved Social Mobilization and Mass Drug Administration**

**Authors:** Jennifer L. Liang, J. King, M. Pa'au, P. Lammie

**Background:** Lymphatic filariasis (LF) affects at least 120 million people worldwide; 40 million have lymphedema, elephantiasis, or hydrocele. American Samoa began a mass drug administration (MDA) program with diethylcarbamazine and albendazole in 2000 after surveys indicated 16.5% of 2,989 residents tested were infected with *Wuchereria bancrofti*, the parasite causing LF. Follow-up surveillance of 917 persons in 2003 in four sentinel villages after three rounds of MDA showed a modest drop in prevalence (13.7%). Reported coverage for the first three rounds of MDA was approximately 50%. After the 2003 assessment, improvements were made to the social mobilization and MDA coverage strategies through the use of mass media and church-based drug distribution. The impact of MDA program changes was assessed 3 years later by measuring the prevalence of LF.

**Methods:** To test for circulating filarial antigen, the rapid Immunochromatographic Card Test (Binax, Portland, ME) was used in a convenience sample of volunteers from the original four sentinel villages plus one additional village. Antigen-positive individuals had a thick blood smear (20 µl) for microfilaria (Mf) testing.

**Results:** Of 1,371 individuals tested (665 men, 706 women), 87.5% reported participation in the 2005 MDA. Of individuals tested, 13 were antigen positive (0.95%), and two (0.15%) of those 13 were Mf positive. Among the 13 antigen positives, two (15.4%) reported never participating in MDA.

**Conclusion:** Results show a decline in antigenemia from 13.7% (2003) to 0.95% (2006) and an associated increase in MDA participation. Although results cannot be generalized beyond the villages tested, the decline in antigen prevalence appears to demonstrate the effectiveness of changes in social mobilization and drug distribution.

**Keywords:** lymphatic filariasis, mass drug administration, elimination, American Samoa

2:15 p.m.

**Ownership and Usage of Insecticide-Treated Nets in Niger After an Integrated Campaign — September, 2006**

**Authors:** Julie I. Thwing, Jodi Vanden Eng, Marcel Lama

**Background:** Mass distribution of insecticide-treated nets (ITNs) is an important strategy to decrease the burden of malaria in endemic countries. In December 2005 and March 2006, Niger distributed polio vaccine and ITNs to children <5 years in a nationwide integrated campaign. Our objective was to determine the post-campaign ownership and usage of ITNs in Niger, with a focus on two high risk groups for malaria: pregnant women and children <5.

**Methods:** We conducted a nationwide survey during peak malaria transmission season using a personal digital assistant (PDA) based questionnaire. Using probability proportional to size sampling, we selected two departments within each of the 8 regions, and 10 villages within each department. We mapped each village using Global Positioning System (GPS) equipped PDAs, that randomly selected 16 households per village (survey total 2,450 households). Analyses were weighted by population.

**Results:** Nationally, 75.5% of households had one or more children <5 and were thus eligible to receive an ITN; 63.0% of households received an ITN. Of households that received one or more ITNs, 96.5% retained them. ITN ownership increased from 4.0% to 65.1%, with ownership increasing most among the poorest. Of households with one or more children <5, 74.6% owned at least one ITN. The night prior to the survey, 89.2% of ITNs were hung, and 55.5% of children <5 and 42.8% of pregnant women had slept under an ITN.

**Conclusion:** The Niger integrated campaign dramatically increased ITN ownership and reduced inequities in net ownership. ITNs were retained and were being used by high risk groups. Further distribution and education on net use are necessary to increase usage to Roll Back Malaria target levels for vulnerable groups.

**Keywords:** malaria, insecticide-treated net, integrated campaign, public health evaluation, survey, child health

2:35 p.m.

### **Clinical Features that Distinguish Dengue Fever from Other Dengue-Like Illnesses Among Children at Initial Presentation**

**Authors:** Mary M. Ramos, K. Tomashek, F. Arguello, A. Rivera, L. Quiñones, J. Muñoz

**Background:** Dengue, a mosquito-borne viral infection, is a leading cause of pediatric hospitalizations in the tropics. It is a growing public health threat throughout the Americas, where 400,000 dengue cases were reported in 2005. Timely diagnosis and supportive care can be life-saving, but may be challenging as initial symptoms are nonspecific and serological tests confirm dengue late in the course.

**Methods:** We reviewed surveillance data from all cases of dengue-like illness (DLI) among children 5-15 years old that were evaluated in Patillas, Puerto Rico between June 2005 and May 2006. We analyzed demographic and clinical data from all laboratory-positive and laboratory-negative cases to identify distinguishing characteristics of dengue infection at initial presentation. Laboratory-positive cases were defined as patients with anti-dengue IgM positivity, IgM seroconversion, or dengue virus identified by polymerase chain reaction (PCR) or viral isolation.

**Results:** Of the 338 DLI case patients, 39 (11.5%) were laboratory-positive and 116 (34.3%) laboratory-negative. Excluded from analysis were 183 (54.1%) laboratory-indeterminate patients. In univariate analysis, laboratory-positive patients were more likely to have rash ( $p < 0.001$ ), a white blood cell count  $\leq 5,000/\text{mm}^3$  ( $p = 0.01$ ), and were older than laboratory-negative patients ( $p < 0.05$ ). Laboratory-negative patients were more likely to report cough ( $p = 0.01$ ). The presence of rash in the absence of cough had a positive predictive value (PPV) of 100% (95% confidence interval [CI] 100-100) and a negative predictive value (NPV) of 79.4% (95% CI 71.1-87.1) in correctly identifying laboratory-positive dengue patients.

**Conclusion:** These clinical markers may help identify dengue among children with DLI in settings where rapid diagnostic tests are not available. Further study is needed to determine the utility of these markers when applied to populations with moderate dengue prevalence.

**Keywords:** dengue, diagnosis, clinical, Puerto Rico

2:55 p.m.

### **Orthopoxvirus Seroprevalence in Residents of Likuuala District, Republic of Congo: A Surrogate Measure for Monkeypox Virus Exposure**

**Authors:** Edith R. Lederman, M. Reynolds, K. Karem, Z. Braden, C. Hughes, R. Regnery, I. Damon

**Background:** Monkeypox virus is a zoonotic orthopoxvirus endemic to central and west sub-Saharan Africa that produces a smallpox-like illness in humans. The natural animal host(s) is/are unknown as is the burden of human exposure in endemic areas. In 2006 we conducted a serosurvey to assess human exposure in the Likuuala Region, Republic of Congo, the site of a monkeypox outbreak in 2003.

**Methods:** Whole blood specimens were collected from 994 residents in Likuuala (2.4% of catchment population), in conjunction with an anemia survey. Anti-orthopoxvirus (OPX) IgM levels were assessed by enzyme-linked immunosorbent assay (ELISA). Demographic and clinical variables were compared with immunologic findings using the chi-square test or Fishers exact test. Multivariate logistical regression was employed to identify characteristics independently associated with anti-orthopox IgM. Odds ratios (OR) with 95% confidence intervals (95% C.I.) were calculated.

**Results:** 1.7% of residents were found to have elevated levels of OPX IgM as evidence of likely monkeypox virus exposure in the previous 6-12 months. Older age ( $> 25$  years)(OR 4.5, 1.3 -15.8) and living in Gangania village (OR 33.5, 7.2 -155.9) were independently associated with positive IgM serostatus. Gender, fever or rash in the past 6 months, and refugee status were not associated.

**Conclusion:** Recent exposure to orthopoxvirus, most likely monkeypox virus, was associated with older age; adults are more likely to hunt and prepare infected carcasses for food. Clinical variables such as fever or rash were not associated with exposure indicating that subclinical infections may be common. A focus of possible monkeypox transmission was identified in one village (Gangania). This village will be targeted for future ecological investigations to identify the definitive animal host(s).

**Keywords:** monkeypox, serology, Republic of Congo, risk factor

Thursday, April 19, 2007  
Session P: The Long Haul — Chronic  
Grand Ballroom  
3:30–5:00 p.m.  
Moderator: Janet Collins

**3:35 p.m.**  
**Prevalence and Correlates of Sunburn Among U.S. Adults, by Race/Ethnicity — Behavioral Risk Factor Surveillance System 1999, 2003, and 2004**

**Authors:** Djenaba A. Joseph, M. Saraiya

**Background:** An estimated 11,000 people died of skin cancer in the United States during 2006. Sunburn is an important preventable risk factor for melanoma and basal cell carcinoma. Prevalence and correlates of sunburn among racial/ethnic minorities have not been described previously.

**Methods:** The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based telephone survey that collects data on health behaviors and conditions from noninstitutionalized adults. Questions about self-reported sunburn in the previous 12 months were included in the 1999, 2003, and 2004 surveys. Data were weighted to the sex, racial/ethnic, and age distributions of each state's adult population using intercensal estimates. Post-stratified data were age-adjusted to the 2000 census. Multivariate logistic regression was used to generate odds ratios (ORs) for associations between sunburn and multiple covariates (e.g., age, sex, and annual household income) for each racial/ethnic group (white, black, Hispanic, Asian/Pacific Islander, and American Indian/Alaska Native).

**Results:** One-third of all adults reported sunburn (33.3%; 95% confidence interval [CI]=33.2%-33.5%). White non-Hispanics (41.8%; 95% CI=41.5%-42.0%) and American Indian/Alaska Natives (25.5%; 95% CI=23.8%-27.3%) had the highest prevalence of sunburn. Among all racial/ethnic groups, the likelihood of sunburn increased with decreasing age. Male gender was associated with a higher prevalence of sunburn among white non-Hispanics (OR=1.3; 95% CI=1.3-1.4) and a lower prevalence among black non-Hispanics (OR=0.8; 95% CI=0.7-0.9). Household income >\$75,000 (vs. <\$15,000) was associated with a higher prevalence of sunburn among all racial/ethnic groups except Asian/Pacific Islanders.

**Conclusion:** Sunburn was reported among racial/ethnic groups not traditionally considered at risk for sunburn or skin cancer. Correlates of sunburn varied by race/ethnicity. Skin cancer prevention messages should emphasize that racial/ethnic minorities are not immune to adverse effects of the sun.

**Keywords:** sunburn, skin cancer, melanoma, epidemiology, risk factor, race/ethnicity

**3:55 p.m.**  
**Improvement in Lipid and Glucose Control Among Blacks with Diabetes — Raleigh and Greensboro, North Carolina, 1997–2004**

**Authors:** Stephanie A. Rutledge, E. Gregg, G. Beckles, D.E. Williams

**Background:** National survey data have indicated improvements in glucose and lipid control; however, it is unclear whether blacks with diabetes have demonstrated such improvements. Evaluating whether glucose and lipid control have changed among blacks is important for implementing public health initiatives.

**Methods:** Among blacks aged  $\geq 18$  years with diabetes in Raleigh and Greensboro, North Carolina, this analysis examined the proportion with uncontrolled glucose or lipids between 1997 and 2004. In 1997, a multistage area probability sample of 407 blacks with diabetes was examined. In 2004, a systematic random sample of 435 blacks with diabetes was examined. The following criteria were used to identify persons not meeting the American Diabetes Association's recommendations for glucose and lipid control: HbA1c >7%, high-density lipoprotein (HDL) cholesterol <40 mg/dL, low-density lipoprotein (LDL) cholesterol >130 mg/dL, total cholesterol >200 mg/dL, and triglycerides >200 mg/dL. Data were weighted to reflect the age and sex composition of the study population and standardized to the 2000 U.S. Census. Two-sided Student's t-tests were used to test the null hypothesis that proportions were equal. Differences were significant at  $p < 0.05$ .

**Results:** During 1997-2004, the proportion of uncontrolled persons declined from 79.2% to 55.7% for HbA1c ( $p < 0.01$ ), 32.3% to 23.5% for HDL ( $p < 0.01$ ), 49.9% to 18.5% for LDL ( $p < 0.01$ ), 57.8% to 26.4% for total cholesterol ( $p < 0.01$ ), and from 16.6% to 11.5% for triglycerides ( $p < 0.05$ ).

**Conclusion:** In North Carolina, blood glucose and lipid control among blacks with diabetes improved between 1997 and 2004. These findings suggest a reduction in the risk of diabetes complications. However, the continued high proportion not meeting recommended levels indicates the need for continued evaluation and approaches to prevent diabetes complications in this population.

**Keywords:** blacks, diabetes, lipids, glucose, cholesterol

4:15 p.m.

**Disparities in Dysphagia Screening Among Acute Stroke Patients — Paul Coverdell National Acute Stroke Registry, 2005–2006**

**Authors:** Amy L. Valderrama, M. George, H. McGruder, J. Croft

**Background:** More than 700,000 people experience stroke each year in the U.S. Dysphagia, or difficulty swallowing, is common after acute stroke and puts a patient at risk for aspiration, pneumonia, and death. Dysphagia screening before oral intake reduces this risk and is a crucial component of hospital care following acute stroke. Our objective was to assess disparities in dysphagia screening among stroke patients in the newly established Paul Coverdell National Acute Stroke Registry, a surveillance system monitoring quality of acute stroke care in U.S. hospitals.

**Methods:** Subjects were 15,876 patients presenting with an acute stroke to a participating hospital in four states (Georgia, Illinois, North Carolina, Massachusetts) during January 2005–September 2006. Descriptive statistics and Chi-square tests for significance were calculated.

**Results:** Mean age of stroke patients was  $69.3 \pm 15.2$  years; 36.0% were aged <65 years, 51.8% were women, 74.0% were white, and 20.7% were African American. Before oral intake, 58.0% (n=9,204) were screened for dysphagia. Whites (57.0%) were less likely to be screened than African Americans (60.1%) ( $X^2=9.9$ ;  $p<.01$ ) or other minorities (63.5%) ( $X^2=13.8$ ;  $p<.001$ ). Patients aged <65 were less likely to receive dysphagia screening than older patients (56.2% versus 59.0%,  $X^2=11.6$ ;  $p<.001$ ). No differences in screening by gender or Hispanic origin were noted.

**Conclusion:** Overall, only half of the stroke population were screened for dysphagia. Rates of dysphagia screening were lower among whites and those aged <65 years. Quality improvement interventions in hospitals should identify barriers to dysphagia screening and implement procedures to improve screening rates overall and in subsets of the stroke population. This will result in improved quality of care in hospitals and enhance quality of life and recovery after stroke.

**Keywords:** stroke, dysphagia, ethnicity

4:35 p.m.

**Depression and Chronic Diseases: A Debilitating Combination — Oregon, 2005**

**Authors:** Clinton C. Haley, K. Hedberg, E. Elman, R. Leman

**Background:** Chronic diseases affect approximately 90 million U.S. residents, and depression affects >14 million U.S. adults annually. Persons with chronic diseases who are depressed have higher mortality rates than those without depression. In 2005, nine validated depression screening questions (Patient Health Questionnaire-9) were added to Oregon's Behavioral Risk Factor Surveillance System (BRFSS). We analyzed these data to examine associations between depression and chronic diseases, their risk factors, and patient self-management behaviors.

**Methods:** Using the population-based BRFSS telephone survey data, we categorized 4,807 respondents by no, mild, and major depression, and compared weighted prevalences by demographics, selected chronic diseases (e.g., diabetes, cardiovascular disease), risk factors (e.g., obesity, smoking), and self-management behaviors (e.g., treatment adherence).

**Results:** Overall depression prevalence was 9.7% (mild 5.0%; major 4.7%). Depression was highest among those aged 18–24 years (12.5%) and lowest among those aged  $\geq 75$  years (5.6%). Chronic disease and risk-factor prevalence increased with increasing depression severity. Compared with those without depression, those with major depression had more asthma (odds ratio [OR]=4.7; 95% confidence interval [CI]=3.0–7.3), stroke (OR=4.1; 95% CI=2.0–8.7), arthritis (OR=3.0; 95% CI=2.0–4.3), diabetes (OR=2.3; 95% CI=1.5–3.5), smoking (OR=4.9; 95% CI=3.3–7.1), and obesity (OR=2.5; 95% CI=1.5–4.1). Depressed patients also were more likely to neglect self-management behaviors, such as nonsmoking among heart disease patients (OR=6.8; 95% CI=2.0–23.2) and performing daily foot checks for sores among diabetic patients (OR=3.5; 95% CI=1.5–8.0).

**Conclusion:** Chronic disease prevalence among Oregonians with depression is higher compared with those without depression and those with depression are less likely to engage in self-management behaviors. This reinforces the importance of screening and treating those with chronic diseases for depression.

**Keywords:** depression, chronic disease, risk factor, behavioral risk factor surveillance system, population surveillance

**Friday, April 20, 2007**  
**Session Q: Don't Procrastinate — Vaccinate;  
Immunizations**  
**Grand Ballroom 8:30–10:00 a.m.**  
**Moderator: Anne Schuchat**

**8:35 a.m.**

**Use of Recruitment Incentives To Increase Uptake of Meningococcal Vaccine During a Community Vaccination Campaign — New York City, 2006**

**Authors:** Trang Q. Nguyen, D. Paone, C. Zimmerman, A. Karpati, L. Guterman, L. E. Thorpe

**Background:** Serogroup C meningococcal disease (SCMD) is potentially fatal; vaccination is a recommended outbreak-control measure. In 2006, the New York City Department of Health and Mental Hygiene (NYCDOHMH) conducted a meningococcal vaccination campaign to address a community SCMD outbreak involving 26 cases, primarily affecting persons with epidemiologic links to illicit drug use. Drug users and their close contacts were targeted for vaccination. “Snowball outreach” with incentives was employed at three syringe exchange programs (SEPs). We assessed snowball outreach as a tool to increase vaccination uptake.

**Methods:** Clients and community members vaccinated at SEPs received three numbered coupons to recruit peers or family members (network contacts) for vaccination. For every coupon returned by a contact regardless of his/her vaccination decision, the contact’s recruiter received a \$4 subway/bus pass. Vaccinated contacts also received three coupons to distribute. NYCDOHMH staff recorded basic demographics of those who received or returned coupons.

**Results:** In 8 weeks, NYCDOHMH vaccinated 2763 persons, including 599 (22%) vaccinated at SEPs. Most vaccinees at SEPs were male (57%), Hispanic (69%), and SEP clients (75%); median age was 40 years. Of 303 vaccinees offered coupons at SEPs, 230 (76%) accepted; 134 (19%) of 688 coupons were returned. Most contacts (64%) who returned coupons requested vaccination. Of 44 identified networks (median of 1 referral wave/network [range=1-3]), the four most extensive networks comprised three referral waves and 18% of returned coupons.

**Conclusion:** Working within networks and in communities linked to SEPs enabled vaccination distribution to the targeted population. Snowball outreach led to shallow penetration of networks but high vaccination uptake among contacts. Snowball outreach merits further evaluation as a method of engaging hard-to-reach populations in public health campaigns.

**Keywords:** New York City, meningococcal disease, vaccination, snowball sampling, drug use

**8:55 a.m.**

**History of Genital Warts Among 18–59 Year Olds in the U.S., National Health and Nutrition Examination Surveys (NHANES), 1999–2004**

**Authors:** Thu-Ha Dinh, E.F. Dunne, M.R. Sternberg, L.E. Markowitz

**Background:** Genital warts (GWs), a sexually transmitted disease (STD), are commonly diagnosed in the United States (US). HPV types 6 and 11 cause > 90% of GWs. The recently licensed quadrivalent HPV vaccine is highly effective in preventing GWs among young women. There are no national estimates on the occurrence of genital warts in the U.S.; reliable population based data on GWs can help monitor the impact of the HPV vaccine.

**Methods:** We analyzed data collected from 1999-2004 in NHANES, a series of cross-sectional national surveys. NHANES uses a complex, stratified probability cluster sampling method to select a representative sample of the U.S. non-institutionalized civilian population. We focused our analysis among 8849 participants aged 18-59 years who answered the question, “Has a doctor or health care professional ever told you that you had genital warts?”. SUDAAN software version 9.01 was used for statistical analysis.

**Results:** Overall, 5.6% (95% confidence interval (CI), 4.9%-6.4%) of the US population reported having a history of diagnosed GWs; 6.6% (95% CI 5.7%-7.7%) among non-hispanic whites; 4.1% (95% CI 3.4%-5.0%) among non-hispanic blacks; and 2.5% (95% CI 1.8%-3.4%) among Mexican Americans. GWs were reported more commonly in women than in men (7.2% vs 4.0%,  $p<0.001$ ). The highest number of individuals reported history of GWs was in 30-39 year old women (12.6%) and 40-49 year old men (5.5%).

**Conclusion:** A history of ever having genital warts was reported in 5.6% of persons ages 18-59 years of age. There is a substantial burden of genital warts in the U.S. that could be greatly reduced with a prophylactic HPV vaccine to HPV types 6 and 11.

**Keywords:** human papillomavirus, genital warts, HPV vaccine

9:15 a.m.

**Safety Surveillance of Quadrivalent Meningococcal Conjugate Vaccine (MCV4, Menactra®)**

**Authors:** Fatma Soud, J. Iskander, E.J. Woo, E. Weintraub, R.L. Davis, E. Miller, K. Kohl, J. Sejvar, P. Haber, K. Walton, R. Ball, C. Marchant, C. Vellozi, L. Lee, M.M. Braun, D. Pratt

**Background:** In January 2005, quadrivalent meningococcal conjugate vaccine (MCV4, Menactra®) was licensed by the US Food and Drug Administration (FDA) and subsequently recommended by the Advisory Committee on Immunization Practices for universal adolescent use against meningococcal disease. For post-licensure safety surveillance, FDA and the CDC use the Vaccine Adverse Event Reporting System (VAERS) to detect rare adverse events (AEs). This report analyzes the most serious AEs reported, including Guillain-Barré syndrome (GBS), a serious neurological disorder involving demyelination of the peripheral nerves causing weakness/paralysis.

**Methods:** We assessed VAERS reports received from April 2005 to November 2006 and confirmed diagnoses of all serious events. The reporting rate of GBS after MCV4 was compared with the incidence rate observed in 11-19 year olds in two databases of the general population (Vaccine Safety Datalink and Healthcare Utilization Project).

**Results:** Of the 1032 reports (18/100,000 doses), 10% (N=106) were serious (1.9/100,000 doses). One death was reported; the autopsy report is pending. Nineteen patients, aged 11-19 years, developed confirmed GBS within 6 weeks of MCV4. The ratio of the reporting rate of GBS following MCV4 to the expected incidence rate was 1.78 (95% CI 1.02-2.85). Other serious events included viral encephalitis (3), viral meningitis (5) transverse myelitis (2), and thrombocytopenia (5).

**Conclusion:** Most VAERS reports described mild, self-limited symptoms consistent with pre-licensure data. The VAERS data suggest a possible small increase in the risk of GBS after MCV4. Due to the limitations of VAERS reporting, these data alone cannot determine causality. Continued surveillance and prospective epidemiological studies to evaluate a possible causal relationship of MCV4 with GBS and other serious adverse events are warranted.

**Keywords:** Guillain-Barré syndrome, neurological, vaccine, adverse events, adolescents

9:35 a.m.

**Carriage Survey During an Outbreak of Meningococcal Serogroup C Disease Among Drug Users and Their Contacts — Brooklyn, New York, 2005–2006**

**Authors:** Eric J. Stern, D. Weiss, C. Zimmerman, R. Silletti, J. Kornblum, L. Lee, M. Brun, M. Hughes, C. Pleatman, N. Messonnier, L. Mayer, T.A. Clark

**Background:** From December 2005-August 2006, 28 cases of *Neisseria meningitidis* serogroup C (SGC) disease with 8 deaths (CFR 28%) occurred in Brooklyn, New York City (NYC). Among 28 case-patients, 13 (46%) were drug users and 7 (25%) were household contacts of drug users. The NYC Department of Health (DOHMH) implemented a vaccination campaign (tetraivalent meningococcal conjugate vaccine [MCV4]) in the drug-using community. CDC and the DOHMH conducted a study of meningococcal carriage to assess the effectiveness of vaccine in interrupting disease transmission.

**Methods:** The vaccine target population was individuals  $\geq 18$  years who used cocaine/crack/ heroin or methadone and resided in four contiguous Brooklyn zip codes. Vaccination and carriage study sites included methadone clinics, syringe exchange programs, drug treatment facilities, soup kitchens, and shelters. Questionnaires were administered to study participants to assess drug use and known risk factors for carriage. Throat swabs were plated; isolates of *N. meningitidis* were identified and characterized using standard methods.

**Results:** Throat swabs were obtained from 1403 participants; median age was 43 years (range 3-85); 61% were male; 81% resided in the four zip codes; 333 (24%) reported using crack/cocaine/heroin, and 398 (29%) were on methadone treatment. Twenty-one (1.5%) of 1403 participants carried meningococcus, with 1 SGC isolate. Drug users were more likely to carry meningococci than non-users, though without statistical significance (odds ratio 2.1, confidence interval 0.8-5.0). The post-vaccine carriage survey was cancelled due to low carriage prevalence and inadequate study power.

**Conclusion:** Similar to other studies, we identified low meningococcal carriage, and very low SGC carriage, in an outbreak associated with high case-fatality. Further evaluation of the effectiveness of MCV4 in preventing meningococcal transmission in outbreak settings is needed.

**Keywords:** *Neisseria meningitidis*, meningococcal, bacteria, nasopharynx

Friday, April 20, 2007  
Session S: Out of the Closet — Clostridia  
Grand Ballroom  
1:30–3:15 p.m.  
Moderator: Roberta Carey

1:35 p.m.

**An Epidemic Hospital Strain as a Cause of Community Associated *Clostridium difficile*-Associated Disease FoodNet Pilot Study, 2006**

**Authors:** Umid M. Sharapov, C. Long, K. Purviance, S. Mickelson, L.A. Ingram, S. Segler, G. Dumyati, S. Lathrop, A. Cronquist, S. Shin, K. Harriman, A. Thompson, G. Killgore, C. McDonald, B. Limbago, F. Angulo

**Background:** *Clostridium difficile* (CD) is the leading infectious cause of antibiotic-associated diarrhea and colitis among inpatients of healthcare facilities but is a historically rare cause of illness in the community. The epidemic CD strain, NAP1, produces binary toxin, has a deletion in the toxin regulatory gene *tcdC*, is rapidly transmitted in hospitals, and has caused outbreaks across the United States. Sporadic CD-associated disease (CDAD) may be increasing among persons in the community; it is not known if the epidemic strain causes community associated CDAD.

**Methods:** Community-associated CDAD (CA-CDAD) was defined in patients who had a CD toxin-positive stool specimen and no hospitalization in the preceding three months based on a medical record review. Toxin-positive stools were cultured anaerobically and available CD isolates were characterized by pulsed-field gel electrophoresis (PFGE), and PCR detection of binary toxin and *tcdC* deletions.

**Results:** Of 1573 cases of CDAD screened, 174 (11%) fulfilled criteria for CA-CDAD. Of 60 available isolates characterized, 13 (22%) were indistinguishable from the epidemic CD strain, NAP1, by PFGE and contained binary toxin and a *tcdC* deletion. NAP1 was identified in five states (range: 10–43% of isolates per state). 29% of CA-CDAD case-patients with NAP1 did not received antibiotics within three months preceding infection.

**Conclusion:** The epidemic CD strain, NAP1, caused community-associated CDAD in at least five states. Such community-associated infections suggest a shift in epidemiology of CD infections, and imply a mechanism for dissemination of NAP1 in the community. Preventing further transmission of NAP1 may rely, in part, on explaining the rapid geographic dissemination of this strain and conducting a prospective study to identify modifiable factors associated with transmission.

**Keywords:** Community-associated *Clostridium difficile* disease

1:55 p.m.

**Botulism Associated with Commercial Carrot Juice — Georgia, 2006**

**Authors:** Petra Wiersma, A. Sheth, C. Shuler, C. Burnett, S. Maslanka, J. Sobel, C. Drenzek

**Background:** Botulism is a potentially fatal paralytic illness caused by *Clostridium botulinum* neurotoxin. Because of its epidemic potential, any botulism case is a public health emergency. On September 8, 2006, three Georgia residents with suspected foodborne botulism were reported to the Georgia Division of Public Health (GDPH). GDPH and CDC initiated a rapid investigation to identify the food vehicle and to prevent additional cases.

**Methods:** GDPH epidemiologists reviewed medical records, issued a nationwide alert, and interviewed patients and family members. CDC tested clinical specimens and food samples for evidence of botulinum toxin.

**Results:** Patients presented to a hospital emergency department on September 8, including a married couple, aged 77 years (male) and 57 years (female), and a female friend, aged 42 years. Symptoms included diplopia, extraocular palsies, dysphagia, and progressive flaccid paralysis requiring intubation. One day before illness onset, they had shared a meal, including carrot juice. Serum and stool samples from all patients tested positive for botulinum toxin Type A, as did Brand A carrot juice, recovered from the friend's home. Failure to refrigerate the juice by the patients was not revealed during the investigation. Brand A carrot juice was subsequently linked to three botulism cases in Florida and Canada.

**Conclusion:** Commercially produced carrot juice caused this botulism outbreak. Rapid investigation led to a voluntary product recall; no additional cases were detected. Because *Clostridium botulinum* spores can be present naturally in flash-pasteurized carrot juice and conditions (low-acidity, low-salinity, and low-sugar content) are favorable to growth, consistent refrigeration during distribution and storage is critical. For carrot juice, additional barriers to growth are necessary to protect consumers.

**Keywords:** botulism, botulinum toxin, botulinum antitoxin, *Clostridium botulinum*, carrot juice

2:15 p.m.

**Toxic Shock Associated with *Clostridium sordellii* and *Clostridium perfringens* Following Induced and Spontaneous Abortion**

**Authors:** Adam L. Cohen, J. Bhatnagar, S. Reagan, C. Ho, J. Hacker, M. Fischer, S. Zane, W. Shieh, J. Guarner, C. Paddock, S. Zaki, L. McDonald

**Background:** Based on limited reporting, a minimum of 55,000 medically induced abortions are performed in the United States annually; the number of spontaneous abortions is unknown. Severe infections following induced or spontaneous abortion are rare. In December 2005, CDC reported four cases of fatal toxic shock caused by *Clostridium sordellii* in women who had a recent medical abortion with mifepristone and misoprostol. To better understand the risk, we have continued to investigate toxic shock in women who had recent abortion.

**Methods:** Unexplained deaths and toxic shock in women who had recent induced or spontaneous abortions were identified through multiple passive adverse drug event and public health reporting avenues. To identify the cause of toxic shock, immunohistochemical assays for multiple bacteria were performed on formalin-fixed tissue specimens from hysterectomy or autopsy. DNA extracted from tissue was evaluated by *Clostridium* species-specific polymerase chain reaction assays. Amplified DNA products were sequenced for confirmation of *Clostridium* species.

**Results:** We identified four additional patients with toxic shock associated with *Clostridium* species infection after abortion. Three women had fatal infections due to *C. perfringens* following induced abortions: one with the regimen of mifepristone and misoprostol, and two with laminaria. One woman had a nonfatal infection due to *C. sordellii* following spontaneous abortion. All four patients had rapidly-progressing, necrotizing endomyometritis. Unlike fatal *C. sordellii* toxic shock, these cases were not uniformly characterized by edema, hemoconcentration, marked leukocytosis, or absence of fever.

**Conclusion:** We found toxic shock following abortion can be caused by *C. perfringens* as well as *C. sordellii*, has a more heterogeneous clinical presentation, and can occur following spontaneous abortion and abortion induced by medical regimens other than mifepristone and misoprostol.

**Keywords:** Toxic shock, *Clostridium sordellii*, *Clostridium perfringens*, medically induced abortion, spontaneous abortion

2:35 p.m.

**Outbreak of *Clostridium perfringens* at Food and Drug Administration Food and Safety Conference — New Orleans, Louisiana, 2006**

**Authors:** Joan M. Brunkard, M. Walker, D. Haydel, L. Kravet, R. Ratard

**Background:** *Clostridium perfringens* is a leading cause of foodborne illness in the United States. In September 2006, sixteen persons attending a Food and Drug Administration (FDA) Food Safety conference reception became ill with acute diarrhea and vomiting; one patient was hospitalized. The Louisiana Office of Public Health conducted an epidemiologic investigation to determine the source of the outbreak and to implement control measures.

**Methods:** Ill reception attendees were interviewed, and stool samples were collected from eight persons. The hotel kitchen was inspected by a sanitarian; kitchen staff were interviewed about food-handling procedures; and a case-control study among 43 of the 65 reception attendees was conducted to assess the association between food items and illness. Case-patients (n=16) included persons who attended the reception, ate at least one food item, and became ill within 24 hours with diarrhea ( $\geq 3$  loose stools in 24 hours) or vomiting. Control subjects (n=27) included reception attendees who ate at least one food item, but did not become ill.

**Results:** All stool samples collected (n=8) tested positive for *C. perfringens* enterotoxin by Perfringens Enterotoxin-Reversed Passive Latex Agglutination (PET-RPLA). Epidemiologic analysis identified two food items associated with *C. perfringens* infection: pork loin roast (odds ratio [OR]=8.8; 95% confidence interval [CI]: 1.7–46.2) and shrimp pasta (OR=25.5; 95% CI=2.9–223.3). Violations cited in the environmental inspection of the hotel kitchen included insufficient temperature monitoring, inconsistent sanitation practices, and pest infestation.

**Conclusion:** Lack of temperature monitoring indicates that food might not have been held at correct temperatures, allowing *C. perfringens* toxins to develop. Staff were educated about appropriate temperatures for holding cooked food, sanitation practices to prevent future outbreaks, and pest control measures.

**Keywords:** foodborne outbreak, *Clostridium perfringens* enterotoxin, food safety, temperature regulation

2:55 p.m.

## Emerging *Clostridium difficile*-Associated Disease in the Community and the Role of Non-Antimicrobial Risk Factors

**Authors:** Preeta K. Kutty, S. Benoit, C. Woods, A. Sena, S. Naggie, J. Fredrick, S. Evans, D. Anderson, K. Wilson, B. Pien, J. Engemann, J. Engel, L.C. McDonald

**Background:** *Clostridium difficile* is responsible for more than \$1 billion annually in excess healthcare costs, with an attributable mortality of 6.9%. Recent reports suggest that this disease may also be emerging in the community. We determined the relative frequency and risk factors for community-associated CDAD (CA-CDAD).

**Methods:** Medical and laboratory records were reviewed from January through December 2005 at six North Carolina hospitals (4 Veteran Affairs (VA) and 2 Community). CDAD was defined as diarrhea with a positive stool *C. difficile* toxin assay. CA-CDAD was defined as CDAD onset in the community or within 72 hours of hospital admission, without inpatient healthcare exposure during the previous 2 months. At four VA hospitals, an unmatched case-control (1:3) study was performed; controls were VA patients chosen randomly from an ambulatory care database.

**Results:** Of 1149 total positive CDAD cases, 249 (22%) [Range 15 – 47% per hospital] were CA-CDAD; median age being 60 (range:19-101) years. Only 42% received antimicrobials. At four VA hospitals, we identified 40 (16%) CA-CDAD cases. Risk factors, using univariate analysis, were antimicrobials, steroids, laxatives and stomach acid-suppressing medications if given within 3 months prior to symptom onset. Using multivariable analysis, CA-CDAD cases were more likely than controls to receive antimicrobials [adjusted odds ratio (aOR)=12.0,95% CI:4.7-28.6, $P=0.0001$ ] as well as have an outpatient visit [aOR=3.9,95% CI:1.3-11.8, $P=0.014$ ] in the prior three months.

**Conclusion:** CA-CDAD may account for a substantial proportion of all CDAD cases and antimicrobials are a major risk factor. Further studies are required to identify sources of *C. difficile* transmission in the community as well as delineate non-antimicrobial risk factors and prevention strategies for CA-CDAD.

**Keywords:** *Clostridium difficile*, antimicrobial use, risk factors, emerging infections

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