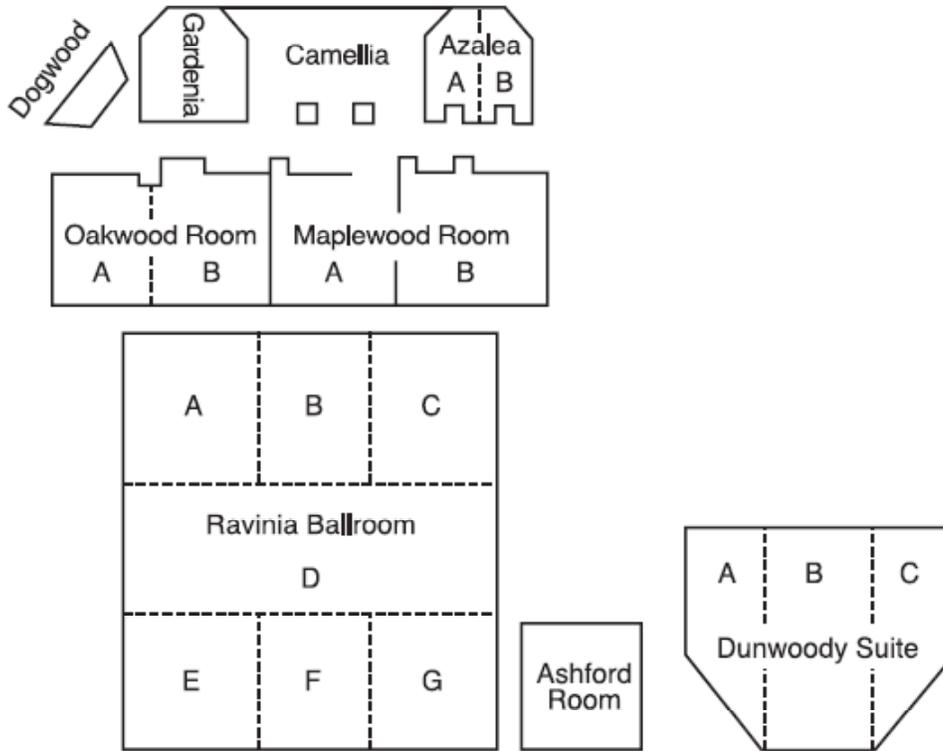


# **57<sup>th</sup> Annual EIS Conference**

***Epidemic Intelligence Service***



# Crowne Plaza at Ravinia



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# Mark Your Calendars!

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

April 20–24, 2009  
Centers for Disease Control and Prevention  
Atlanta, Georgia

## Preface

Dear Friends of EIS:

Welcome to the 57<sup>th</sup> Annual Epidemic Intelligence Service (EIS) 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 95 oral presentations and 30 poster presentations. In addition, your experience this week will be enriched by International Night, the EIS skit, the Prediction Run, special award presentations, and other activities that have long been a tradition at the Conference.

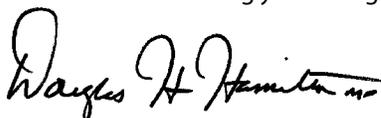
In past years, I have usually started this introduction with a description of the participation of EIS officers in major public health emergencies, including anthrax, SARS, West Nile Virus, hurricanes, and tsunamis. Fortunately, for the second year in a row, we have not had to face a major public health disaster (pandemic influenza is still out there lurking in the wings). Nevertheless, officers have been busy with more traditional investigations, many of which have made the nightly news. This past year, EISOs investigated clusters of MDR TB, botulism in canned chili, formaldehyde in FEMA trailers, and multistate outbreaks of *Salmonella sp.* associated with pot pies, cheese, dog food, and small turtles. And of course they were faced with the Georgia resident with diagnosed XDR TB who traveled throughout Europe. Internationally, we witnessed a resurgence of the hemorrhagic fevers, with Rift Valley Fever in Kenya, Marburg virus in Uganda, and Ebola virus in both Uganda and the Democratic Republic of Congo. You should hear about all of these and many more investigations in greater detail during this year's program.

As always, we extend a special welcome to the new incoming EISOs, members of the Class of 2008. This was another very successful application process, with >300 applications received. Several very accomplished applicants who would likely have been offered spots in the past were not accepted because the applicant pool was so competitive. Once again, I believe that the strong applicant pool mostly results from efforts of our alumni. Word-of-mouth still seems to be our most effective recruiting tool, although this year we again made use of a number of professional and academic list-serves to get the message out.

This year's 81 "red tags" are a select group of men and women with a broad array of interests and skills. Fifty-eight of the new officers are women (72%), and 11 are citizens of other nations (14%). The countries represented in this year's class are Bosnia and Herzegovina, Brazil, Canada, Colombia, India (2), Italy, Nepal (2), Pakistan, and South Korea. Among the 70 who are U.S. citizens or permanent residents, 26 represent racial and ethnic minority groups (37%). Included are 36 PhD-level scientists (45%), 31 physicians (39%), 12 veterinarians (15%), one dentist (1%), and one doctor of physical therapy (1%). One of the MDs and one of the veterinarians also hold PhDs, and two of the PhDs are also nurses. Nine members of the class have accepted prematch assignments in state health departments.

This year, we will again be running concurrent oral sessions on Tuesday and Wednesday mornings, so please check your program carefully. Several special sessions will also be included in this year's conference. Tuesday's lunchtime session is entitled "Tracking Our Future: National Center for Health Statistics Data and Activities in Monitoring Child and Adolescent Health and Well-Being." A special session on Thursday at lunchtime is entitled "Overdosed America: Medication Morbidity and Mortality in the United States." Finally, Friday's lunchtime will include a special session entitled "Current Status and New Directions for EIS."

The 2008 Conference provides you 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

# Program Committees

## 2008 EIS Conference

### Scientific Program Committee

**Lara Akinbami**, National Center for Health Statistics

**Diana Bensyl**, Office of Workforce and Career Development

**Bruce Bernard**, National Institute for Occupational Safety and Health, Co-Chair

**Thomas Clark**, National Center for Immunization and Respiratory Diseases

**Julie Gilchrist**, National Center for Injury Prevention and Control

**Maryam Haddad**, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention

**Ruth Jiles**, National Center for Chronic Disease Prevention and Health Promotion

**George Luber**, National Center for Environmental Health/Agency for Toxic Substances and Disease Registry

**Eric Mintz**, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, Chair

**Priti Patel**, National Center for Preparedness, Detection, and Control of Infectious Diseases

**Nancy Sahakian**, National Institute for Occupational Safety and Health

**Theresa Smith**, National Center for Zoonotic, Vector-Borne, and Enteric Diseases

**Lorraine Yeung**, National Center on Birth Defects, and Developmental Disabilities



### 2008 EIS Conference Scientific Program Committee

Front row, left to right, **E. Mintz, N. Sahakian, J. Gilchrist, D. Bensyl, T. Smith, R. Jiles, L. Yeung**  
Back row, left to right, **M. Haddad, B. Bernard, G. Luber, T. Clark, L. Akinbami, P. Patel**

## Latebreaker Session Committee

**Diana Bensyl**, Office of Workforce and Career Development , Chair

**Maryam Haddad**, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention

**Theresa Smith**, National Center for Zoonotic, Vector-Borne, and Enteric Diseases

## Program Production

**Ron Edwards**, EIS Program

**Doug Hamilton**, EIS Program

**Dorothy N. Jones**, EIS Program

**Mae Lee**, EIS Program

**Erica Lowe**, EIS Program

**Leslie Parker**, Creative Services

**Kay Smith-Akin**, OWCD Science Office

**Alene Westgate**, EIS Program

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 2008 EIS Conference.

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

The findings and conclusions in these presentations have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

# 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 Ravinia Ballroom on the main floor of the hotel. Check-in and on-site registration will be available from 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 assist 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 ringers on phones 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 Camellia Room, the Message Board System 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 numbers 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 Dogwood Room, this room is available for presenters who need to make changes to their presentations. Three computers with PowerPoint software, re-writable CD-ROM drives, and a printer will be available from 8:00 a.m.–6:00 p.m. Monday–Thursday.

## EXHIBIT HALL

Monday–Thursday, 8:00 a.m.–5:00 p.m. in the Preconvene Area outside the Ravinia Ballroom. Check out what's going on at each of CDC's National Centers when you stop by their information tables.

### Color Key Name Tags

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

## 2008 EIS Conference Program Schedule

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**Monday, April 14, 2008**

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**7:30 Registration Desk Opens**

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

**8:30 Session A: I Read the News Today, Oh Boy . . . .**  
**Opening Session ..... Ravinia Ballroom**  
**Moderators: Julie L. Gerberding and Stephen B. Thacker**

8:35 Homicide Trends in New Orleans, Louisiana, 1999–2006. *Joan Brunkard*

8:55 Adverse Events from Cough and Cold Medications in Children — United States, 2004–2005. *Melissa Schaefer*

9:15 Evaluation of Gestational Weight Gain Guidelines and Pregnancy Outcomes Among Obese Women — Los Angeles County, 2007. *Derek Ehrhardt*

9:35 Trends in Incidence of Late-Onset Methicillin-Resistant *Staphylococcus aureus* Infection in Neonatal Intensive Care Units — United States, 1995–2004. *Fernanda Lessa*

9:55 Dracunculiasis Outcomes and Determinants of Broken Worms — Ghana, 2007. *Mary Glenshaw*

**10:15 BREAK**

**10:45 Session B: Hit Me With Your Best Shot — Immunizations..... Ravinia Ballroom**  
**Moderator: Nancy Messonnier**

10:50 Immunization Screening Among Newly Arrived Refugees Versus Asylum Recipients — District of Columbia, 2003–2007. *Shua Chai*

11:10 Coinfection with Community-Onset *Staphylococcus aureus* and Influenza Among Children — Atlanta, GA, 2006–2007. *Carrie Reed*

11:30 Using Immunization Information Systems To Evaluate Effectiveness of Pneumococcal Conjugate Vaccine Among Children. *Riyadh Muhammad*

11:50 Investigation of Hepatitis A Linked to Ethiopian Adoptees and Their Contacts — Multiple States, 2007. *Gayle Fischer*

**12:15 LUNCH**

**12:30 Poster Session — Meet the authors in the Ravinia 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: Cheeseburger in Paradise

- P1. Power of Combining Routine Molecular Subtyping and Specific Food Exposure Interviews During an *Escherichia coli* O157:H7 Outbreak — Minnesota, 2007. *Stacy Holzbauer*
- P2. Outbreak of *Salmonella enterica* Serovar Typhimurium Associated with a Postwedding Celebration — Virginia, 2007. *Katie Kurkjian*
- P3. Vibriosis Epidemiology and Lack of Patient Knowledge of Disease — Maryland, 2002–2006. *Rakhee Palekar*
- P4. Beaver Fever? Outbreak of Giardiasis Associated with Drinking Water — New Hampshire, 2007. *David Blaney*
- P5. Impact of Household Water Treatment and Hygiene Promotion on Diarrhea Among Rapidly Weaned Infants of HIV-Infected Mothers — Kenya, 2005–2007. *Julie Harris*
- P6. Outbreak of Giardiasis at a Boy Scout Camp — California, 2007. *Amy Karon*
- P7. Barriers To Maintaining the Microbiologic Quality of Drinking Water, South Sulawesi, Indonesia — Bantaeng and Maros Districts, 2007. *Samir Sodha*
- P8. Investigation of a *Campylobacter* Outbreak Associated with Eating Cheese Made from Unpasteurized Milk — Kansas, 2007. *Titilayo Aghoghovbia*
- P9. *Salmonella* Typhimurium Outbreak Associated with Raw Milk and Cheese Consumption — Pennsylvania, 2007. *Tai-Ho Chen*
- P10. Outbreak of *Campylobacter jejuni* Associated with Unpasteurized Milk — South Carolina, 2007. *Kira Christian*
- P11. *Salmonella enterica* Subtype Montevideo Infections Associated with a Fast Food Restaurant — Georgia, 2006. *Petra Wiersma*
- P12. Coccidioidomycosis: Knowledge, Attitudes, and Practices Among Health Practitioners — Arizona, 2007. *Sanny Chen*
- P13. Nosocomial Transmission of Newly Identified Adenovirus Serotype 14 Among Healthcare Workers Caring for Patients with Severe Pneumonia — Oregon, 2007. *Philip Gould*
- P14. Asthma Prevalence by Urban-Rural Status — United States, 2005. *Teresa Morrison*
- P15. Influenza Among Outpatient Children — United States, 2007. *Vivek Shinde*
- P16. Adenovirus Serotype 14 Infection at a Military Training Installation in South Texas, 2007. *John Su*

### 1:30 Session C: Mercy, Mercy, MRSA — MRSA ..... Ravinia Ballroom

#### Moderators: Scott Fridkin and Jeff Hageman

- 1:35 Outbreak of Methicillin-Resistant *Staphylococcus aureus* Among High School Football Players — New York City, 2007. *Hemanth Nair*
- 1:55 Methicillin-Resistant *Staphylococcus aureus* Hospitalizations Among the American Indian/Alaska Native Population, 1996–2005. *Kathy Byrd*
- 2:15 Investigation of the Eighth Case of Vancomycin-Resistant *Staphylococcus aureus* — Michigan, 2007. *Jennie Finks*
- 2:35 Potential Impact of *Staphylococcus aureus* Vaccine on Invasive Methicillin-Resistant *Staphylococcus aureus* Disease in the United States. *Cynthia Lucero*

### 3:00 BREAK

**3:15 Session D: Safety Dance — Injury ..... Ravinia Ballroom****Moderator: Ileana Arias**

- 3:20 Factors Associated with Fatal All-Terrain Vehicle Crashes — West Virginia, 1999–2006. *Aron Hall*
- 3:40 Characteristics of Perpetrators in Homicide-Followed-by-Suicide Incidents: National Violent Death Reporting System — 17 Select States, 2003–2005. *Joseph Logan*
- 4:00 Injury Risk Among Pickup Truck Drivers — Kentucky, 2000–2004. *Suzanne Beavers*
- 4:20 Counting the Burden of Motor-Vehicle–Related Whiplash Injury Using Multiple Diagnoses. Does It Make a Difference? A National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP) Special Study. *John Halpin*
- 4:40 Prevalence of Rollover Protective Structures (ROPS) on Farm Tractors — United States, 2001 and 2004. *Kelly Loring*
- 5:00 Unintentional Strangulation Deaths Among Children and Adolescents: The “Choking Game” — United States, 1995–2007. *Robin Toblin*

**5:30 Cash-Bar Social..... Conference Preconvene Area**


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**Tuesday, April 15, 2008**

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**8:30 Concurrent Session E1: The Tide Is High —  
Recreational Water ..... Ravinia Ballroom****Moderator: Michael Beach**

- 8:35 Up the Creek Without a Personal Flotation Device: Paddle Sports–Related Fatalities — Maine, 2000–2007. *J. Eric Tongren*
- 8:55 Cryptosporidiosis Outbreak Associated with an Interactive Splash Park — Idaho, 2007. *Randall Nett*
- 9:15 Health Symptoms Among Lifeguards at an Indoor Water Park, Ohio, 2007. *Bich Dang*
- 9:35 Association Between Swimming Pool Operator Certification and Reduced Pool Chemistry Violations — Nebraska, 2005–2006. *Bryan Buss*
- 9:55 Cryptosporidiosis Outbreak Linked to Multiple Recreational Water Venues — Utah, 2007. *Renee Calanan*

**8:30 Concurrent Session E2: Just the Two of Us —  
Reproductive Health.....Dunwoody Suites****Moderator: R. J. Berry**

- 8:35 Reliability of Self-Reported Prepregnancy Weight, Height, and Body Mass Index on Birth Certificates — Florida, 2005. *Sohyun Park*
- 8:55 Herbal Use Before and During Pregnancy — United States, 1998–2003. *Cheryl Broussard*
- 9:15 Smoking Cessation During Pregnancy and Preterm Birth in Seven States — ID, KY, NY, PA, SC, TN, WA, 2004. *Laura Polakowski*
- 9:35 Screening Room: Missed Opportunities for Prevention of Perinatal Group B Streptococcal Disease — United States, 2003–2004. *Melissa Van Dyke*
- 9:55 Evaluation of HIV Testing at Labor and Delivery — Kenya, 2007. *Helen Dale*

**10:15 BREAK**

**10:45 Concurrent Session F1: Every Breath You Take — Respiratory/Vaccine-Preventable Diseases ..... Ravinia Ballroom**  
**Presentation of the Iain C. Hardy Award**

**Moderator: Chris Van Beneden**

- 10:50 Outbreak of *Mycoplasma pneumoniae* at a College in Maine — 2007. *J. Eric Tongren*
- 11:10 Community Outbreak of Pertussis — Leake and Neshoba Counties, Mississippi, 2007. *Stanley Wei*
- 11:30 Outbreak of Measles — Dar es Salaam, Tanzania, 2006: Need for a Two-Dose Measles Vaccine Strategy. *James Goodson*
- 11:50 Adenovirus 14 Illness Among Basic Military Trainees, 2007. *Jacqueline Tate*

**10:45 Concurrent Session F2: In a Big Country — Obesity .....Dunwoody Suites**

**Moderator: William “Bill” Dietz**

- 10:50 Association Between Awareness of a Community-Based Intervention Program and Walking Among African-American Adults: Findings from the 2005–2006 REACH 2010 Risk Factor Survey. *Isa Miles*
- 11:10 Knowledge of Physical Activity Guidelines Among United States Adults, HealthStyles 2003–2005. *Latetia Moore*
- 11:30 Associations Between Changes in Vigorous Physical Activity Levels, Obesity Status, and Depressive Symptoms Among Older Women. *Dianna Densmore*
- 11:50 Morbid Obesity and Hospital Discharges — Ohio, 2002–2005. *Michael Cooper*

**12:15 LUNCH**

**12:30 Special Session: Tracking Our Future: National Center for Health Statistics Data and Activities in Monitoring Child and Adolescent Health and Wellbeing .....Dunwoody Suites**

**Moderator: Lara Akinbami**

**Speakers: Susan Lukacs and Andrea MacKay**

**12:30 Poster Session. Posters on display in the Ravinia 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: Sweet Child of Mine — Childhood/Adolescence ..... Ravinia Ballroom**  
**Moderator: Beth Stevenson**

- 1:50 Long-Term Survival Among Infants with Congenital Diaphragmatic Hernia — Metropolitan Atlanta, 1979–2003. *Cynthia Hinton*
- 2:10 Evaluation of Exclusion Policies During a Large Shigellosis Outbreak Associated with Child Care-Aged Children — Mississippi, 2007. *Elizabeth Russo*
- 2:30 Infant Pertussis and Opportunities for Prevention — King County, Washington, January 1, 2002–November 2, 2007. *Matthew Hanson*
- 2:50 Effectiveness of Second-Dose Varicella Vaccination Administered During an Outbreak — Philadelphia, Pennsylvania, 2006. *Michael Nguyen*
- 3:10 Severe Symptoms Associated with Coxsackievirus B1 Among Children — Los Angeles County, California, 2007. *Kanta Sircar*
- 3:30 Evaluation of the Foodborne Diseases Active Surveillance Network (FoodNet) Surveillance System for Pediatric Hemolytic Uremic Syndrome — United States, 2000–2005. *Melissa Viray*

4:00 BREAK

6:00 Prediction Run..... Brook Run Park

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**Wednesday, April 16, 2008**

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**8:30 Concurrent Session H1: Working for a Living — Occupational Health .....Dunwoody Suites**

**Moderator: Christine Branche**

- 8:35 Low Hepatitis B Vaccination Coverage Among Healthcare Personnel at Long-Term Care Facilities — Pinellas County, Florida, 2007. *Nicola Thompson*
- 8:55 Effectiveness of Comprehensive Preventive Program To Reduce Beryllium Sensitization at a Beryllium Metal, Oxide, and Alloy Production Plant. *Rachel Bailey*
- 9:15 Women's Workplace Discrimination, Race and Psychological Distress: Evidence from the National Longitudinal Surveys. *Fang Gong*
- 9:35 Industrywide Medical Surveillance of Respiratory Function Among Flavor Manufacturing Workers — California, 2005–2007. *Thomas Kim*
- 9:55 Cluster of Organic Dust Toxic Syndrome Cases Among Urban Landscape Workers — Metropolitan Denver, Colorado, July 2007. *Tegan Boehmer*

**8:30 Concurrent Session H2: She Blinded Me with Science ..... Ravinia Ballroom Peavy Finalists**

**Moderator: Owen Devine**

- 8:35 The Changing Epidemiology of *Salmonella* serotypes — United States, 1996–2006. *Amy Boore*
- 8:55 Decrease in Methicillin-Resistant *Staphylococcus aureus* Following an Infection-Control Intervention — Pennsylvania, 1999–2007. *Katherine Ellingson*
- 9:15 Lifetime Ovulatory Cycles and Ovarian Cancer Survival — United States, 1980–1997. *Cheryl Robbins*
- 9:35 Estimating HIV Prevalence and Risk Behaviors Among Male Clients of Female Sex ..... Workers — Bangkok, Thailand, August–October 2007. *Neha Shah*
- 9:55 Is Influenza Circulation Associated with Incidence of Invasive Pneumococcal Disease? .. *Nicholas Walter*

10:15 BREAK

**10:30 Concurrent Session I1: Goodness Gracious — Sexually Transmitted Diseases ..... Ravinia Ballroom**

**Moderator: John Douglas**

- 10:35 Prevalence of Sexually Transmitted Infections Among Female Adolescents in the United States: Data from the National Health and Nutrition Examination Survey, 2003–2004. *Sara Forhan*
- 10:55 Evaluation of Partner Services for Treatment of *Chlamydia trachomatis* in Family Planning Clinics — California, 2005–2006. *Ying-Ying Yu*
- 11:15 Evaluation of the Impact of Revised Treatment Recommendations on the Use of Fluoroquinolones for Gonorrhea Treatment — United States, 2007. *Deborah Dowell*

- 11:35 Inclusion of Azithromycin Resistance Status Increases the Discriminatory Ability of the *Treponema pallidum* Molecular Subtyping System — San Francisco, 2004–2006.  
*Kenneth Katz*

**10:30 Concurrent Session I2: Killing Me Softly — Chronic Illnesses .....Dunwoody Suites**  
**Moderator: Janet Collins**

- 10:35 Analysis of Two New Alcohol Use Questions on the 2007 Georgia Youth Risk Behavior Survey. *Paul Melstrom*
- 10:55 Do Modifiable Risk Factors Remain Uncontrolled Among Diabetic Adults with Lower Extremity Disease (LED)? *Rashida Dorsey*
- 11:15 The Impact of a New Sex-Specific Definition of Binge Drinking on Prevalence Estimates for Women — United States, 2001–2006. *Pollyanna Chavez*
- 11:35 Frequent Mental Distress and Chronic Conditions — 2004 Jordan BRFSS. *Italia Rolle*

**12:00 LUNCH**

**12:30 Poster Session — Meet the authors in the Ravinia 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: Things That Make You Go Hmmm . . . .**

- P17. The Association Between Sexual Violence and HIV — Swaziland, 2007. *Sapna Bamrah*
- P18. Late HIV Diagnosis Among Injection-Drug Users in 33 U.S. States, 2001–2004.  
*Anna Grigoryan*
- P19. Number of Named Partners Identified by Persons with Acute Versus Established HIV Infection — North Carolina, 2002–2007. *Zackary Moore*
- P20. Register's Annual Great Bicycle Ride Across Iowa: Can Hand-Cleansing Be Improved?  
*Deborah Dufficy*
- P21. Cluster of Methicillin-Resistant *Staphylococcus aureus* in a Burn Unit — New York State, 2007. *Jenifer Jaeger*
- P22. Using Active Microbiologic Surveillance During an Outbreak of Healthcare-Associated Extended Spectrum Beta-Lactamase–Producing *Klebsiella pneumoniae* Infections — New Jersey, 2007. *Adam Langer*
- P23. A Fungus Among Us: Outbreak of Zygomycosis Among Hematology Patients — Georgia, 2007. *Eloisa Llata*
- P24. Outbreak of Polymicrobial Bloodstream Infections Among Pediatric Hematology-Oncology Patients — United States, 2007 *Sarah Schillie*
- P25. Missed Opportunity? Identification of Sexually Transmitted Infections by HIV Care Providers in Mozambique — 2006–2007. *Nandini Selvam*
- P26. West Nile Neuroinvasive Disease in Wyoming and Surrounding States — 2007.  
*Stacey Anderson*
- P27. Evaluation of Birth Certificate Accuracy — Kentucky, 2006. *Suzanne Beavers*
- P28. Hurricane Katrina Deaths — Louisiana, 2005. *Joan Brunkard*
- P29. Demographic Characteristics of Adult Cigarette Smokers — United States, 2006.  
*Shane Davis*
- P30. Pilot of the CDC Natural Disaster Surveillance Morbidity Report Form for Acute Care Setting — Georgia, July–August 2007. *Leslie Hausman*

**1:30 Session J: Wild Thing — Vectorborne/Zoonotic Diseases..... Ravinia Ballroom****Moderator: Lonnie King**

- 1:35 Zika Virus Outbreak — Yap, Federated States of Micronesia, 2007. *Mark Duffy*
- 1:55 Net Effect of Numbers: Factors Associated with Usage of Insecticide-Treated Nets in Kenya After Mass Distribution. *Jimee Hwang*
- 2:15 Distinguishing Plague from Posers: Clinical Features Associated with Laboratory-Confirmed *Yersinia pestis* Infections in Rural Madagascar. *Ingrid Weber*
- 2:35 Hot Chicks! Multistate *Salmonella* Montevideo Outbreaks Associated with Exposure to Poultry from Mail-Order Hatcheries — United States, 2007. *Umid Sharapov*
- 2:55 Tightening Tiny Turtle Trafficking: A Multistate Outbreak of Human *Salmonella* Paratyphi B (serovar Java) Infections Associated with Small Turtle Exposure — United States, 2007. *Julie Harris*
- 3:15 Cutaneous Anthrax Associated with Drum-Making by Using Goat Hides from West Africa — Connecticut, 2007. *Alice Guh*

**3:45 BREAK****4:00 Session K: Alexander D. Langmuir Memorial Lecture and Reception..... Ravinia 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****Moderator: Stephen B. Thacker****Speaker: Ross C. Brownson, PhD****Director, Prevention Research Center, Department of Community Health School of Public Health, Saint Louis University, St. Louis, MO****Topic: Physical Activity and Public Health: Does the Environment Matter?****5:30 EIS Alumni Association Meeting ..... Maplewood Room****7:30 Session L: Field Epidemiology — Translating Science into Practice Around the World — International Night .....Dunwoody Suites****Moderators: Roger Glass and Roberto Flores****Cosponsored by:** Coordinating Office for Global Health (COGH) /Division for Global Public Health Capacity Development and the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET).

- 7:35 Cervical Cancer Epidemiology in Fiji, 2004–2007 — Informing Human *papillomavirus* Vaccine Policy. *Irwin C. Law*
- 7:55 Human Immune Deficiency Virus (HIV) Outbreak Investigation Among Hospitalized Children — Shymkent City, Southern Kazakhstan Region, June–November 2006. *Gulmira J. Sailybayeva*
- 8:15 Large Epidemic of Hantavirus Infections in Baden-Wuerttemberg, Germany, 2007. *Christian Winter*
- 8:35 First Reported Outbreak of Suspected Green Tobacco Sickness in Brazil: Arapiraca, Alagoas State, Brazil, 2007. *Patricia P.V. Oliveira*

- 8:55 Cutaneous Anthrax Outbreak in a Village of West Bengal, India, 2007: The Danger of Unsafe Handling of Infected Cow Meat. *Tapas Kumar Ray*
- 9:15 Influenza Surveillance — Vietnam, 2006–2007. *Nila Dharan*
- 9:35 Late Breaking Report — TBD

**International Night Poster Session (Viewing, 6:30–7:30 p.m.)**

- P1. Here We Go Again: Another *Shigella* Outbreak, Cavite, Philippines — July 2007. *Eleanor L. Repatacodo*
- P2. Factors Associated with Acquiring Sexually Transmitted Infections (STIs) Among Patients in Zvishavane District, Zimbabwe, 2006. *Chadambuka Addmore*
- P3. Economic Evaluation of Rubella and Control Strategies During an Outbreak in Fortaleza, Brazil, 2007. *Daniel M. Mota*
- P4. Mushroom Poisoning: A Major Food Poisoning Problem in Yunnan, China 2001–2006. *Chen Lei*
- P5. Influenza Vaccination Coverage Among Persons Aged >60 Years After an Immunization Campaign Offering Free Vaccines: Beijing, China, 2007. *Ying Wang*
- P6. Performance of Measles Surveillance System in Kenya, 2004–2007. *James W. Njeru*
- P7. Effects of a Comprehensive Law Banning Smoking in Enclosed Spaces in the Province of Trento, Italy 2005–2006. *Pirous Fateh-Moghadam*
- P8. Could a High Number of Social Contacts in the Health-Care Sector Lead to Staff Shortage During an Influenza Pandemic? Comparing Social Contact Data of Bavarian Health-Care Workers and the German General Population. *Helen Bernard*
- P9. Mothers and Health Workers Can Influence Adolescent Girls with Reproductive Tract Infection for Them To Seek Care in Government Facilities — South 24-Parganas, West Bengal, India, 2007. *Shyamali Rudra*
- P10. Malnutrition Prevalence Among Less Than Five-Year-Old Children of Xinca and Impact of Its Research in Maternal-Infant Program — Santa Rosa, Guatemala, December 2005. *Lisette E. Reyes*

**9:45 Presentation of William H. Foege Award.....Dunwoody Suites Closing Remarks**

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**Thursday, April 17, 2008**

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**8:30 Session M: Mackel the Knife..... Ravinia Ballroom Mackel Award Finalists**

**Moderators: Michael McGeehan and James Stephens**

- 8:35 Snack Attack: Multistate Outbreak of *Salmonella* Serotypes Wandsworth and Typhimurium Infections Associated with Consumption of a Puffed Vegetable Snack Food — United States, 2007. *Anandi Sheth*
- 8:55 Multistate Measles Outbreak Associated with an International Youth Sporting Event — Pennsylvania, Michigan and Texas, August–September, 2007. *Tai-Ho Chen*
- 9:15 Investigation of a Multidrug-Resistant *Acinetobacter baumannii* Outbreak — Phoenix, 2007. *Cynthia Lucero*
- 9:35 Multiple Clusters of Hepatitis C Virus Infections Associated with Anesthesia for Outpatient Endoscopy Procedures — New York City, 2005–2006. *Bruce Gutelius*
- 9:55 Not the Conventional Dogma: Multistate Outbreak of Human *Salmonella* Serotype Schwarzengrund Infections Caused by Contaminated Dry Dog Food — Northeastern United States, 2006–2007. *Casey Barton Behraves*

**10:15 BREAK****10:30 Session N: Do You Really Want To Hurt Me? — Healthcare-Associated Illness ..... Ravinia Ballroom****Moderators: Cliff McDonald and Arjun Srinivasan**

- 10:35 Cystoscopy-Related *Pseudomonas aeruginosa* Outbreak — New Mexico, 2007. *Aaron Wendelboe*
- 10:55 Outbreak of Late-Onset Group B Streptococcus in a Neonatal Intensive Care Unit — Tennessee, 2007. *Jennifer MacFarquhar*
- 11:15 Outbreak of Surgical Site Infections Following Coronary Artery Bypass Graft Surgery — United States, 2007. *Sarah Schillie*
- 11:35 Multistate Outbreak of *Acanthamoeba* Keratitis Associated with Use of a Contact Lens Solution. *Jennifer Verani*

**12:00 LUNCH****12:30 Special Session: Overdosed America: Medication Morbidity and Mortality in the United States .....Dunwoody Suites****Moderator: Len Paulozzi****Speakers: Len Paulozzi, Bob Rolfs, Kay Sanford, and Dan Budnitz****1:30 Session O: Don't Stand So Close To Me..... Ravinia Ballroom****Moderators: Eugene McCray and Thomas Navin**

- 1:35 Transplantation-Transmitted Tuberculosis — Oklahoma, 2007. *Emily Piercefield*
- 1:55 Impact of Antiretroviral Therapy and Cotrimoxazole Preventive Therapy on Survival of HIV-Infected Patients with Tuberculosis — Cambodia, 2007. *Rinn Song*
- 2:15 Epidemiology of Tuberculosis Among Foreign-Born Children and Adolescents in the United States, 1994–2006. *Heather Menzies*
- 2:35 Treatment-Related Adverse Events Among Multidrug-Resistant Tuberculosis Patients — Latvia, 2000–2003. *Emily Bloss*
- 2:55 Investigation of an International Traveler with Suspected Extensively Drug-Resistant Tuberculosis — United States, 2007. *Ann Buff*

**3:15 BREAK****3:30 Session P: Alice's Restaurant — Fast Food ..... Ravinia Ballroom****Moderator: Kristin Holt**

- 3:35 *Salmonella Enterica* Serotype Newport Outbreak Associated with Mexican-Style Cheese — Illinois 2006–2007. *Ingrid Trevino*
- 3:55 Multistate Investigation of *Escherichia coli* O157:H7 Infections Associated with Frozen Pizza. *Jennifer MacFarquhar*
- 4:15 Misadventures in Microwaving: Multistate Outbreak of *Salmonella* I 4,[5],12:i: — Infections Associated with Commercially Produced Frozen Pot Pies — United States, 2007. *Rajal Mody*
- 4:35 Not a Clever Retort: Multistate Outbreak of Botulism Caused by Commercially Canned Hot Dog Chili Sauce — June–August, 2007. *Patricia Juliao*

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

**8:30 Session Q: Eye in the Sky — Surveillance..... Ravinia Ballroom**

**Moderator: Denise Koo**

- 8:35 National Surveillance for Carbon Monoxide Poisoning Hospitalizations — United States, 2005. *Shahed Iqbal*
- 8:55 Differing Gonorrhoea Rates by Race in Montana — What Is the Role of Incomplete Race Reporting? *Bridget Andrew*
- 9:15 Prevalence of Cervical Cancer Screening Among Human Immunodeficiency Virus (HIV)-Infected Women — Selected U.S. States, 2000–2004. *Alexandra Oster*
- 9:35 Moving the Goalposts: Impact of New Definitions of Penicillin Resistance for *Streptococcus pneumoniae*. *Meredith Deutscher*

**10:00 BREAK**

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

**10:30–11:45 a.m.**

**Moderators: Doug Hamilton and Bruce Bernard**

**12:00 LUNCH**

**12:30 Special Session: Current Status and New Directions for EIS..... Dunwoody Suites**

**Moderator: Denise Koo**

**Speakers: Denise Koo, Richard Hoffman and Lisa Pealer**

**1:30 Session S: One Night in Bangkok — International ..... Ravinia Ballroom**

**Presentation of the Paul C. Schnitker International Health Award**

**Moderator: Sonja Olsen**

- 1:35 Impact of Changing Growth Standards on the Prevalence of Acute Malnutrition and Operations of Feeding Programs in Darfur, Sudan (2005–2007). *Christopher Howard*
- 1:55 Improvement in Hand Hygiene Practices Among Healthcare Personnel Following Initiation of an Infection Control Program — Kenya, 2007. *Katherine Ellingson*
- 2:15 Fungal in the Jungle — Development and Evaluation of a New Rapid Diagnostic Test for Histoplasmosis — a Wild Opportunity To Improve Survival — Guatemala, 2007. *Roque Miramontes*
- 2:35 Determinants of Oral Rehydration Therapy Utilization — Asembo District, Kenya, 2007. *Christine Olson*
- 2:55 Evaluation of Active Population-Based Surveillance for Pneumonia — Thailand, 2007. *Oliver Morgan*

**3:15 Closing Remarks and Adjournment ..... Ravinia Ballroom**

**Stephen B. Thacker, Director**

**Office of Workforce and Career Development**

# Presenting EIS Officers

## EIS Officers by Coordinating Office, National Center, or OD Office

### COGH

Italia Rolle

### NCBDDD

Cheryl Broussard  
Cynthia Hinton

### NCCDPHP

Pollyanna Chavez  
Shane Davis  
Dianna Densmore  
Isa Miles  
Latetia Moore  
Cheryl Robbins

### NCEH/ATSDR

Sapna Bamrah  
Leslie Hausman  
Christopher Howard  
Shahed Iqbal  
Teresa Morrison

### NCHS

Rashida Dorsey  
Laura Polakowski

### NCHHSTP

Emily Bloss  
Ann Buff  
Helen Dale  
Deborah Dowell  
Gayle Fischer  
Sara Forhan  
Anna Grigoryan

Heather Menzies

Alexandra Oster  
Nandini Selvam  
Neha Shah  
Rinn Song  
Nicola Thompson

### NCIPC

John Halpin  
Joseph Logan  
Robin Toblin

### NCIRD

James Goodson  
Philip Gould  
Riyadh Muhammad  
Carrie Reed  
Vivek Shinde  
Jacqueline Tate  
Melissa Van Dyke  
Nicholas Walter  
Stanley Wei

### NCPDCID

Kathy Byrd  
Meredith Deutscher  
Nila Dharan  
Katherine Ellingson  
Eloisa Llata  
Fernanda Lessa  
Cynthia Lucero  
Oliver Morgan  
Melissa Schaefer  
Sarah Schillie

### NCZVED

Casey Barton Behravesh  
Amy Boore  
Mark Duffy  
Julie Harris  
Jimee Hwang  
Patricia Juliao  
Roque Miramontes  
Rajal Mody  
Christine Olson  
Elizabeth Russo  
Umid Sharapov  
Anandi Sheth  
Samir Sodha  
Jennifer Verani  
Melissa Viray  
Ingrid Weber

### NIOSH

Rachel Bailey  
Bich Dang  
Fang Gong  
Kelly Loring

### OWCD

Titilayo Aghoghovbia  
Stacey Anderson  
Bridget Andrew  
Suzanne Beavers  
David Blaney  
Tegan Boehmer  
Joan Brunkard  
Bryan Buss  
Renee Calanan  
Shua Chai

Sanny Chen

Tai-Ho Chen  
Kira Christian  
Michael Cooper  
Deborah Dufficy  
Derek Ehrhardt  
Jennie Finks  
Mary Glenshaw  
Alice Guh  
Bruce Gutelius  
Aron Hall  
Matthew Hanson  
Stacy Holzbauer  
Jenifer Jaeger  
Amy Karon  
Kenneth Katz  
Thomas Kim  
Katie Kurkjian  
Adam Langer  
Jennifer MacFarquhar  
Paul Melstrom  
Zackary Moore  
Hemanth Nair  
Randall Nett  
Michael Nguyen  
Rakhee Palekar  
Sohyun Park  
Emily Piercefield  
Kanta Sircar  
John Su  
J. Eric Tongren  
Ingrid Trevino  
Aaron Wendelboe  
Petra Wiersma  
Ying-Ying Yu

### Key for Presenting EIS Officers

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

## Incoming EIS Class of 2008

Anderson, Paul, MD, MPH  
Archer, W. Roodly, PhD, MS  
Barradas, Danielle, PhD  
Bhattarai, Achuyt, MD, PhD, MS  
Blau, Dianna, DVM, PhD  
Borse, Nagesh, PhD, MS, Bphar  
Burrer, Sherry, DVM, MPH  
Cavallaro, Elizabeth, MD, MPH  
Cavanaugh, J. Sean, MD  
Christensen, Deborah (Daisy), PhD, MPH, BSN  
Cortes, Jennifer, MD  
Da Costa Ribeiro, Isabela, PhD, MS  
Date, Kashmira, MBBS, MPH  
Dawood, Fatima, MD  
De Perio, Marie, MD  
Dhakal Sanjaya, PhD, Mphil, MS  
Doshi, Saumil, MD  
Duffy, Jonathan, MD, MPH  
Esposito, Douglas, MD, MPH  
Fournier, Mary, MD, MPH  
Frammartino, Brunella, PhD, MS  
France, Anne, PhD, MPH  
Gardner, Tracie, PhD, MS  
Gladden, R. Matthew, PhD  
Gonzalez, Vanessa, PhD, MS  
Gracia, J. Nadine, MD, MS  
Gregory, Cria, PhD  
Gregory, Christopher, MD, MPH  
Groenewold, Matthew, PhD, MSPH  
Hale, Christa, DVM, MPH  
Han, George, MD  
Husain, Farah, DMD, MPH  
Iuliano, A. Danielle, PhD, MPH  
Jackson, Michael, PhD, MPH  
Janusz, Kristen, DVM, MPH  
Jentes, Emily, PhD, MPH  
Kennedy, Erin, DVM, MPH, MS  
Kidd, Sarah, MD, MPH  
Kim, Clara, PhD, MS, MA  
Kirkcaldy, Robert, MD, MPH, MS  
Lamb, Molly, PhD  
Lee, Soo-Jeong, PhD, MS  
Lobelo, Felipe, MD, PhD  
Loustalot, Fleetwood, PhD, FNP, RN  
Lowther, Sara, PhD(c), MPH  
Lutterloh, Emily, MD, MPH  
May, Ashleigh, PhD, MS  
McElroy, Kristina, DVM, MPH  
McMullan, Laura, PhD  
Meites, Elissa, MD, MPH  
Mitchell, Tarissa, MD  
Modi, Surbhi, MD, MPH  
Nasrullah, S. Muazzam, MBBS, MPH  
Nichols, Megin, DVM, MPH  
Nielsen, Carrie, PhD  
Njai, Rashid, PhD, MPH  
Parks, Sharyn, PhD, MPH  
Patel, Minal, MD  
Phillips, Ghasi, SD, MS  
Powell, Krista, MD, MPH  
Preacely, Nykiconia, DrPH, MPH  
Pride, Kerry, DVM, MPH  
Radcliffe, Rachel, DVM, MPH  
Redwood, Yanique, PhD, MPH  
Ricks, Philip, PhD, MPH  
Ritchey, Matthew, DPT, MPH  
Robertson, Kis, DVM, MPH  
Roess, Amira, PhD, MPH  
Serdarevic, Fadila, MD, MPH  
Siston, Alicia, PhD, MPH  
Sreenivasan, Meera, MD, MPH  
Stauffer, Kendra, DVM  
Sullivan, Loretta, MD, MPH  
Suryaprasad, Anil, MD  
Ta, Maduc, PhDc, MPH  
Thomas, Cynthia, DVM, MPH  
Townes, David, MD, MPH  
Vagi, Sara, PhD, MS  
Vora, Surabhi, MD, MPH  
Wise, Matthew, PhDc, MPH  
Zipprich, Jennifer, PhD, MS

## 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 done while in the EIS. The award is given to a manuscript or publication done 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 a current EIS officer. The outstanding 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 that 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.

## 2008 Award Committee Members

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

Philip Brachman (EIS '54, Chair)  
Marion Kainer (EIS '00)  
Janet Mohle-Boetani (EIS '90)

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

George Luber (EIS '02, Chair)  
Priti Patel (EIS '02)

### **Outstanding Poster Presentation Award**

Tom Clark (EIS '01)  
Julie Gilchrist (EIS '97)  
Nancy Sahakian (EIS '02)  
Lorraine Yeung (EIS '02)

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

Michael Deming (EIS '83)  
Doug Hamilton (EIS '91, Ex-Officio)  
Steve Jones (EIS '69, Ex-Officio)  
John McGowan (EIS '69)  
Michael Pratt (EIS '89)  
Frank Richards (EIS '82)  
Bill Schaffner (EIS '66)  
Myron Schultz (EIS '63, Chair)

### **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**

Katherine Feldman (EIS '00)  
Jennifer McQuiston (EIS '98)  
Nina Marano  
Carol Rubin (EIS '90)  
Peter Schantz (EIS '74)  
Jennifer Wright (EIS '02)

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

Lara Akinbami (EIS '98)  
Owen Devine (EIS '79)  
Robin Ikeda (EIS '01)  
David Sencer (EIS '75)

## **Awards Presented at the 2007 EIS Conference**

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

**Methamphetamine Use is Independently Associated with Risky Sexual Behaviors and Adolescent Pregnancy**

*L.B. Zapata, S.D Hillis, P.M Marchbanks, K.M Curtis, and R. Lowry*

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

**Epidemiologic and Molecular Investigation of an Outbreak of Hepatitis C Virus Infection at a Hemodialysis Unit — Richmond Virginia, 2006**

*Nicola Thompson, Y. Khudyakov, I. Williams, R. Novak, S. Ramachandran, G. Xia, L. Ganova-Raeva, S. Bialek, B. Bell, and M. White-Russell*

### **Outstanding Poster Presentation Award**

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

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

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

*Joshua Mott and Peter Cegielski*

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

*Dixie Snider*

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

*Avid Reza*

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

*Brendan Flannery*

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

*Jennifer Wright*

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

*Abhijeet Anand and David Lowrance*

## Alexander D. Langmuir Lectures, 1972–2007

- 1972** Prevention of Rheumatic Heart Disease — Fact or Fancy. *Charles H. Rammelkamp*
- 1973** Cytomegaloviral Disease in Man: An Ever Developing Problem. *Thomas H. Weller*
- 1974** Hepatitis B Revisited (By the Non-Parenteral Route). *Robert W. McCollum*
- 1975** Origin, Spread, and Disappearance of Kuru: Implications of the Epidemic Behavior of a Disease in New Guineans for the Epidemiologic Study of Transmissible Virus Dementias. *D. Carleton Gajdusek*
- 1976** The Future of Epidemiology in the Hospital. *Paul F. Wehrle*
- 1977** The Historical Evolution of Epidemiology. *Abraham Lilienfeld*
- 1978** The Biology of Cancer: An Epidemiological Perspective. *Sir Richard Doll*
- 1979** The Epidemiology of Antibiotic Resistance. *Theodore C. Eickoff*
- 1980** Health and Population Growth. *Thomas McKeown*
- 1981** The Pathogenesis of Dengue: Molecular Epidemiology in Infectious Disease. *Scott B. Halstead*
- 1982** The Epidemiology of Coronary Heart Disease: Public Health Implications. *Henry W. Blackburn, Jr.*
- 1983** Sexually Transmitted Diseases — Past, Present and Future. *King K. Holmes*
- 1984** Poliomyelitis Immunization — Past and Future. *Jonas E. Salk*
- 1985** An Epidemiologist's View of Postmenopausal Estrogen Use, or What to Tell Your Mother. *Elizabeth Barrett-Connor*
- 1986** Hepatitis B Virus and Hepatocellular Carcinoma: Epidemiologic Considerations. *Robert Palmer Beasley*
- 1987** Environmental Hazards and the Public Health. *Geoffrey Rose*
- 1988** Lymphotropic Retroviruses in Immunosuppression. *Myron E. (Max) Essex*
- 1989** Aspirin in the Secondary and Primary Prevention of Cardiovascular Disease. *Charles H. Hennekens*
- 1990** Epidemiology and Global Health. *William H. Foege*
- 1991** Public Health Action in a New Domain: The Epidemiology and Prevention of Violence. *Garen J. Wintemute*
- 1992** *Helicobacter pylori*, Gastritis, Peptic Ulcer Disease, and Gastric Cancer. *Martin J. Blaser*
- 1993** Diet and Health: How Firm Is Our Footing? *Walter C. Willett*
- 1994** Alexander D. Langmuir: A Tribute to the Man. *Philip S. Brachman and William H. Foege*
- 1995** Epidemiology and the Elucidation of Lyme Disease. *Allen C. Steere*
- 1996** 50 Years of Epidemiology at CDC. *Jeffrey P. Koplan*
- 1997** Public Health, Population-Based Medicine, and Managed Care. *Diana B. Petitti*
- 1998** Pandemic Influenza: Again? *Robert Couch*
- 1999** The Evolution of Chemical Epidemiology. *Philip J. Landrigan*
- 2000** Does *Chlamydia pneumoniae* Cause Atherosclerotic Cardiovascular Disease? Evaluating the Role of Infectious Agents in Chronic Diseases. *Walter E. Stamm*
- 2001** Halfway Through a Century of Excellence. *J. Donald Millar*
- 2002** Public Health Response to Terrorism: Rising to the Challenge. *Marcelle Layton*

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

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

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

**2006** Measuring Malaria. *Brian Greenwood*

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

## Alexander D. Langmuir Prize Manuscripts, 1966–2007

- 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 C: 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 EM 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 Contraceptives, Noncontraceptive Estrogens, and Other Factors. *JAMA* 1979;242:1150–4.  
*D.B. Petitti, J. Wingerd, J. Pellegrin, et al.*
- 1980** Injuries from the Wichita Falls Tornado: Implications for Prevention. *Science* 1980;207:734–8.  
*R.I. Glass, R.B. Craven, D.J. Bregman, et al.*
- 1981** Respiratory Irritation due to Carpet Shampoo: Two Outbreaks. *Environ Int* 1982;8:337–41.  
*K. Kreiss, M.G. Gonzalez, K.L. Conright, A.R. Scheere* and  
Toxic-Shock Syndrome in Menstruating Women: Association with Tampon Use and *Staphylococcus aureus* and Clinical Features in 52 Cases. *N Engl J Med* 1980;303:1436–42.  
*K.N. Shands, G.P. Schmid, B.B. Dan, et al.*
- 1982** Risk Factors for Heatstroke: A Case-Control Study. *JAMA* 1982;247:3332–6.  
*E.M. Kilbourne, K. Choi, T.S. Jones, S.B. Thacker*

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# Abstracts

## 2008 Conference Abstracts

Monday, April 14, 2008

Session A: I Read the News Today, Oh Boy . . . .

Opening Session

Ravinia Ballroom 8:30–10:15 a.m.

Moderators: Julie L. Gerberding and Stephen B. Thacker

8:35 a.m.

Homicide Trends in New Orleans, Louisiana, 1999–2006

**Authors:** Joan M. Brunkard, C.M. Williams, D.M. Bensyl

**Background:** In 2006, New Orleans had the highest murder rate in the United States, at 85 homicides/100,000 persons, 15 times the national average of 5.7/100,000. In response to public perception that murders have increased since Hurricane Katrina, we sought to assess homicide trends for 1999–2006 and recommend strategies to reduce violent crime.

**Methods:** We used New Orleans vital statistics and Uniform Crime Report data for 1999–2006 to calculate the homicide rate per 100,000 population and the proportion of all deaths attributable to homicides. The annual July 1 Census estimates served as the denominator for all years except 2005, where a time-weighted estimate was used to account for hurricane-related population change. We used chi-square and regression analysis to assess temporal trends in homicides by age, sex, and race/ethnicity.

**Results:** The murder rate in New Orleans has increased linearly since 1999 ( $P=0.01$ ), and the proportion of deaths classified as homicides increased from 2.9% in 1999 to 8.6% in 2006 ( $P<0.0001$ ). During 1999–2006, no significant changes in demographic characteristics of victims occurred: 90% were male ( $P=0.32$ ), and 89% were black ( $P=0.56$ ). Mean age for victims and offenders was 29.5 (95% confidence interval [CI]: 28.9–30.0) and 30.5 (95% CI: 29.1–31.9), respectively. In 2007, New Orleans again had the highest murder rate in the United States.

**Conclusions:** Homicides are a serious and growing problem in New Orleans. Although we expected murders to occur predominantly among teenagers and young adults, the older mean age for both victims and offenders presents a challenge to traditional intervention approaches, which primarily target youth. We are working with state and community partners to develop strategies to reduce violent crime.

**Keywords:** homicides, New Orleans, murder rate, Hurricane Katrina

**8:55 a.m.**

### **Adverse Events from Cough and Cold Medications in Children — United States, 2004–2005**

**Authors:** Melissa K. Schaefer, N. Shehab, A. Cohen, D. Budnitz

**Background:** Recently, reports of infant deaths attributed to cough and cold medications have raised concerns among health departments, professional organizations, and parents, as these medications are so commonly used in children. The Food and Drug Administration is currently reviewing recommendations regarding use and safety of these medications. We described morbidity from cough and cold medications in children to help target safety interventions.

**Methods:** We identified emergency department (ED) visits for adverse drug events (ADEs) from cough and cold medications among children less than 12 years old from a nationally representative stratified probability sample of 63 United States EDs from January 1, 2004, through December 31, 2005. ADEs were attributed to these medications based on treating clinicians' diagnoses.

**Results:** Annually, an estimated 7,091 patients under 12 years old were treated in EDs for ADEs from cough and cold medications, accounting for 5.7% of ED visits for ADEs from all medications (95% confidence interval [CI]=4.5%–6.9%) in this age group. Sixty-four percent of estimated visits from cough and cold ADEs occurred among children two to five years old (95% CI=56%–72%). Unsupervised ingestions accounted for 66% of estimated ED visits from cough and cold medications (95% CI=56%–76%), which was significantly higher than ED visits from unsupervised ingestions of other medications (47%, 95% CI=41%–54%); Seventy-seven percent of unsupervised ingestions of cough and cold medications occurred among children two to five years old (95% CI=69%–85%).

**Conclusions:** The majority of ADEs from cough and cold medications in children were due to ingestions without adult supervision. Improvements to bottles and packaging, designed to reduce unsupervised ingestions among two to five years old, could be particularly helpful in reducing morbidity from these medications.

**Keywords:** drug safety, over-the-counter drugs, prescription drugs, pediatrics

**9:15 a.m.**

### **Evaluation of Gestational Weight Gain Guidelines and Pregnancy Outcomes Among Obese Women Los Angeles County, 2007**

**Authors:** Derek T. Ehrhardt, P. Simon, L. Rollin, C. Bish, D. Bensyl

**Background:** Nationally, the prevalence of obesity among women who delivered live infants increased from 13% in 1993 to 22% in 2003. The Institute of Medicine (IOM) recommends obese women gain  $\geq 15$  pounds during pregnancy but does not provide an upper limit. To help determine the need for a defined gestational weight gain range for obese women, we evaluated 2007 Los Angeles County birth certificate data regarding full-term live-born singleton births.

**Methods:** Univariate and multivariate logistic regression analyses were used to evaluate associations between maternal weight gain and preeclampsia, cesarean delivery, or having a low birth weight (LBW;  $< 2,500$  grams) or macrosomic infant ( $\geq 4,000$  grams) among 15,193 women with prepregnancy obesity (body mass index [BMI]  $\geq 30$  kg/m<sup>2</sup>). Weight gain categories were 0–15 pounds, >15–25 pounds, and >25 pounds. Obese women who gained >15–25 pounds were used as the referent. Odds ratios adjusted (aOR) for known confounders and 95% confidence intervals (CIs) were calculated.

**Results:** Gaining >25 pounds increased odds of cesarean delivery (aOR: 1.24; 95% CI, 1.15–1.35), preeclampsia (aOR: 1.33; 95% CI, 1.02–1.71), and macrosomia (aOR: 1.61; 95% CI 1.44–1.81). Gaining 0–15 pounds decreased odds of macrosomia (aOR: 0.78; 95% CI, 0.67–0.92), but increased odds of LBW (aOR: 2.13; 95% CI, 1.49–3.03). Results remained essentially unchanged after adjusting for confounders.

**Conclusions:** Obese women who follow IOM gestational weight gain recommendations decrease their risk for LBW; however, gaining >25 pounds might increase risk for maternal complications and for having a macrosomic infant. Gestational weight gain of >15–25 pounds might improve maternal and infant outcomes for obese women, demonstrating the need for an upper weight gain limit.

**Keywords:** pregnant women, weight gain, obesity, low birth weight, macrosomia

9:35 a.m.

### Trends in Incidence of Late-Onset Methicillin-Resistant *Staphylococcus aureus* Infection in Neonatal Intensive Care Units — United States, 1995–2004

**Authors:** Fernanda Lessa, J. Edwards, S. Fridkin, F. Tenover, T. Horan, R. Gorwitz

**Background:** *Staphylococcus aureus* is a leading cause of infection in neonatal intensive care unit (NICU) patients >3 days-old. Methicillin-resistant *Staphylococcus aureus* (MRSA), associated with increased mortality and medical costs, is increasingly being reported in NICU outbreaks. We assessed the scope and magnitude of MRSA infections with onset after 3 days of age (late-onset MRSA infections) in NICUs.

**Methods:** We analyzed data reported by NICUs participating in the National Nosocomial Infections Surveillance (NNIS) System from 1995-2004. For each month of reporting, all nosocomial infections (NIs) were reported along with isolate antimicrobial susceptibilities. We calculated pooled mean rates of MRSA among all *S. aureus* NIs, combining data from all NICUs, by birth weight category and year of infection. Poisson regression was used to assess changes in incidence of late-onset MRSA NIs per 10,000 neonate-days.

**Results:** Overall, 149 NICUs reported 4,831 *S. aureus* infections and 5,878,139 neonate-days. Methicillin resistance could be determined for 4,302 *S. aureus* isolates, of which 975 (23%) were MRSA. MRSA incidence was 2.9, 1.5, 0.9, and 0.9 per 10,000 neonate-days in birth weight categories  $\leq 1000$ g, 1001–1500g, 1501–2500g, and  $>2500$ g, respectively. Overall MRSA incidence, combining all birth weight categories, remained stable from 1995 through 1997 ( $p=0.2$ ), but increased 138% from 1.3 in 1998 to 3.1 in 2004 ( $p<0.0001$ ). Distribution of MRSA infection by body site did not vary over the study period; 302 (31%) of MRSA infections were bloodstream infections, 175 (18%) were pneumonia, and 136 (14%) were skin/soft tissue infections.

**Conclusion:** The incidence of late-onset MRSA infections increased substantially between 1998 and 2004 in NICUs, indicating a need to reinforce infection control recommendations and explore potential new sources and routes of transmission.

**Keywords:** neonatal intensive care units, *Staphylococcus aureus*, infection, surveillance

9:55 a.m.

### Dracunculiasis Outcomes and Determinants of Broken Worms — Ghana, 2007

**Authors:** Mary T. Glenshaw, S. Roy, E. Ruiz-Tiben, M. Eberhard, P. Downs

**Background:** Dracunculiasis, or Guinea worm disease (GWD), a preventable parasitic infection, causes severe pain and functional disability. GWD has been widely eradicated in Africa, but in 2006, 4,100 cases were reported in Ghana. Approximately 20% of GWD patients reportedly suffered from worm breakage and exacerbated morbidity, phenomena unique to Ghana. In 2007, a study was conducted to validate and describe Guinea worm (GW) breakage and determinants.

**Methods:** This 9-week prospective cohort study involved observing GWD case management in three districts. We collected demographic data and observed daily treatment of persons with newly protruding worms. Worm outcomes were observed and classified as removed or broken. Worm breakage determinants were analyzed with multivariable logistic regression; specimens were collected for pathologic analysis.

**Results:** Among 219 study patients, 102 (47%) experienced worm breakage. GW breakage attributable to incorrect patient management (58%) was more frequent than patient noncompliance (33%;  $P = 0.02$ ). In univariate analysis, delayed treatment initiation increased breakage risk (risk ratio [RR]: 2.3;  $P<0.05$ ). Without treatment delays, when outcomes occurred during the first 2 days, worm breakage (68%) was more frequent than removal (32%;  $P<0.05$ ), possibly because of aggressive traction. In multivariable analysis controlling for demographics, GWD history, and clinical variables, protective factors included antibiotic ointment use (RR: 0.3;  $P<0.01$ ), bandage protocol compliance (RR: 0.4;  $P<0.05$ ), and intact bandages (RR: 0.2;  $P<0.01$ ). Further, worms described as “thin” were significantly more likely to break than typical worms (RR: 3.1;  $P<0.05$ ), concurring with pathologic examination.

**Conclusions:** GW breakage occurs at a high rate in Ghana. Case management and patient care need improvement. Improvements in provider training, patient education, and treatment protocol adherence can reduce the disabling consequences of broken worms.

**Keywords:** parasitic disease, Dracunculiasis patient care

**Monday, April 14, 2008**  
**Session B: Session B: Hit Me With Your Best Shot — Immunizations**  
**Ravinia Ballroom 10:45 a.m.–12:15 p.m.**  
**Moderator: Nancy Messonnier**

**10:50**  
**Immunization Screening Among Newly Arrived Refugees Versus Asylum Recipients**  
**District of Columbia, 2003–2007**

**Authors:** Shua J. Chai, S. Cookson, T. Vu

**Background:** Refugees are screened for immunizations soon after US arrival, which decreases their risk for vaccine preventable diseases. Asylum recipients, or asylees, who are granted asylum while residing in the US are infrequently screened in most jurisdictions; their vaccination needs are largely unknown. Uniquely, the District of Columbia (DC) Department of Health (DOH) screens many asylees through local agency collaborations. We compared need for immunization and time elapsed before vaccine administration among DC refugees versus asylees.

**Methods:** We used data from refugee and asylee medical screening examinations administered by the DC DOH during September 2003–August 2007. CDC vaccination recommendations were used to determine the need for diphtheria-tetanus-acellular-pertussis (DTaP), measles-mumps-rubella (MMR), and polio vaccinations in children and adolescents and diphtheria-tetanus (Td) and MMR vaccinations in adults. US entry and DOH screening dates were used to calculate time elapsed before vaccination administration.

**Results:** Of 781 persons who completed the DOH screening, 151 (19%) were refugees and 630 (81%) were asylees. Refugee and asylee children had similar need for DTaP (49% versus 52%), MMR (62% versus 66%), and polio (44% versus 44%) vaccinations. Refugee and asylee adults had similar need for MMR (64% versus 67%) and Td (61% versus 64%) vaccinations. However, asylees were screened much later after US arrival than refugees (54 weeks versus 1 week;  $P < 0.001$ ), even after adjusting for demographic characteristics.

**Conclusions:** Asylees in DC are similar to refugees in their need for immunizations but receive screening much later. Because delays in immunizations place asylees and the public at risk, asylees in DC and possibly in jurisdictions where asylee screening is infrequent should be assessed for immunization needs with the same urgency as refugees.

**Keywords:** health status disparities, vulnerable populations, refugees, immunization

**11:10**  
**Coinfection with Community-Onset *Staphylococcus aureus* and Influenza Among Children — Atlanta, GA, 2006–2007**

**Authors:** Carrie Reed, A. Kallen, M. Patton, K. Arnold, M. Farley, J. Hageman, L. Finelli

**Background:** Every year, 5%–20% of the U.S. population gets influenza, resulting in more than 200,000 hospitalizations and 36,000 deaths. Infection with both influenza and *S.aureus* can cause severe pneumonia, resulting in hospitalization or death. During the 2006–07 influenza season, 22 of 73 influenza-associated pediatric deaths reported to CDC involved co-infection with *S.aureus*, a dramatic increase from previous seasons. No formal surveillance for influenza-*S.aureus* co-infection has been conducted, and the frequency and severity is unknown.

**Methods:** To estimate the burden of co-infection we conducted a retrospective cohort study of children admitted to Atlanta pediatric hospitals from October 2006–April 2007. We used laboratory reports to identify patients with influenza infection or *S.aureus* cultured from a sterile site or respiratory specimen. Data were collected from medical records on medical history, clinical course, treatment, and outcomes.

**Results:** We identified 7 children hospitalized with influenza-*S.aureus* co-infection, 58 with influenza alone, and 167 with community-onset *S.aureus* alone. Children with *S.aureus*-influenza were more likely to be admitted to the ICU (74%,  $p=0.05$ ) than children with influenza (28%) or *S.aureus* alone (39%) and also had a higher case fatality rate (29%,  $p=0.01$ ) than those with either infection alone (0% with influenza, 5% with *S.aureus*). Influenza vaccination coverage was very low overall (10%), although 76% of patients had indications for vaccination.

**Conclusions:** Infection with community-onset *S.aureus* was relatively common among children hospitalized with influenza. Co-infected children had a higher frequency of severe outcomes than those with a single pathogen. Additional studies are needed to describe the prevalence of and risk factors for co-infection and to determine the role of influenza vaccination and antiviral agents in reducing severe illness and death.

**Keywords:** influenza, pneumonia, *S. aureus*

11:30

### Using Immunization Information Systems To Evaluate Effectiveness of Pneumococcal Conjugate Vaccine Among Children

**Authors:** Riyadh D. Muhammad, C.R. Friedman, T.H. Taylor, A. Thomas, J. Hadler, S. Balter, E. Zell, C. Whitney

**Background:** Post-licensure vaccine effectiveness (VE) studies are critical for promoting vaccination but can be costly and labor-intensive. State-based immunization information systems (IIS) contain individual vaccination data from multiple providers and may be useful alternatives to traditional VE study methods which require patient interviews and review of provider records to determine vaccination history. We evaluated using IIS for assessing 7-valent pneumococcal conjugate vaccine (PCV7) effectiveness.

**Methods:** We performed a nested case-control study using IIS in states A and B, states with high IIS participation rates. Study population included children born between 1998-2002 enrolled in each IIS. We linked IIS vaccination data for all children to pneumococcal disease data from CDC's Active Bacterial Core surveillance. Cases were defined as a PCV7-serotype pneumococcus isolated among residents 3-59 months old. Receipt of  $\geq 1$  PCV7 dose was considered vaccinated. Controls were individually matched to cases by county (state A) or zip-code (state B), birth month and year. VE was calculated as (1-matched odds ratio) X 100% and compared to a similar case-control VE study where vaccination histories were gathered using traditional methods.

**Results:** We identified 19 cases and 10,790 controls in state A; 5% of cases and 39% of controls were vaccinated and VE was 94% (95%CI, 54%-99%). In state B, we identified 14 cases and 494 controls; 21% of cases and 50% of controls were vaccinated and VE was 89% (95%CI, 51%-97%). VE using traditional methods were 100% (state A; 95%CI, 72-100) and 93% (state B; 95%CI, 40-99).

**Conclusions:** VE using IIS with high participation were similar to VE using traditional methods. IIS may be useful for evaluating VE by saving time and resources required for collecting vaccine histories.

**Keywords:** pneumococcal conjugate vaccine, immunization information systems, vaccine effectiveness, nested case-control study, surveillance

11:50

### Investigation of Hepatitis A Linked to Ethiopian Adoptees and Their Contacts — Multiple States, 2007

**Authors:** Gayle Fischer, E. Teshale, C. Miller, C. Shumann, K. Winter, F. Elson, K. Horan, C. Reed, G. Armstrong, J. Perz

**Background:** Advisory Committee on Immunization Practices (ACIP) guidelines recommend hepatitis A vaccination for persons traveling to countries with high or intermediate hepatitis A virus (HAV) endemicity. In June 2007, hepatitis A cases linked to recently adopted Ethiopian children from one adoption agency (AA1) and their contacts were reported by multiple states. We initiated an investigation to assess the extent of HAV transmission and help implement control measures.

**Methods:** We identified families who adopted Ethiopian children from AA1 during a 3-month period beginning 30 days (i.e., average incubation period) before the first reported case. Local health department personnel administered questionnaires to targeted families and reviewed surveillance records for hepatitis A cases associated with international adoptions from 2006-2007. A case of hepatitis A was defined using the existing Centers for Disease Control and Prevention/Council of State and Territorial Epidemiologists case definition as clinical hepatitis that was laboratory confirmed (IgM antibody to HAV-positive) or was linked to a laboratory confirmed case.

**Results:** Forty-nine families from 22 states adopted Ethiopian children through AA1 between April and June, 2007; 43 (88%) families participated. Four persons with hepatitis A, including one fulminant case, were identified: one adoptee, two non-traveling contacts of adoptees, and one contact of a secondary case. Additional hepatitis A cases in five states were linked to adoptees from multiple agencies and countries, with 14 (61%) of 23 cases occurring in non-traveling contacts.

**Conclusions:** Acutely infected persons arriving in the United States may transmit HAV. The findings suggest the need to extend ACIP guidelines to include hepatitis A vaccination for non-traveling contacts of adoptees from countries with high and intermediate HAV endemicity.

**Keywords:** hepatitis A, hepatitis A virus, hepatitis A vaccine, international adoptions

**Monday – Friday Poster Session**  
**Meet the Authors**  
**Ravinia Ballroom**  
**12:30–1:30 p.m.**  
**Posters 1–16: Cheeseburgers in Paradise**  
**Posters 17–30: Things That Make You Go**  
**Hmmm . . . .**

**Poster 1**  
**Power of Combining Routine Molecular Subtyping**  
**and Specific Food Exposure Interviews During an**  
***Escherichia coli* O157:H7 Outbreak — Minnesota,**  
**2007**

**Authors:** Stacy M. Holzbauer, B. Miller, S. Jawahir,  
K. Smith

**Background:** *Escherichia coli* O157:H7 (O157) causes an estimated 73,000 infections and 61 deaths in the United States annually. During May 1–4, 2007, the Minnesota Department of Health (MDH) identified five clinical O157 isolates with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns through routine surveillance. For both *Xba*1 and *Bln*1 enzymes, the patterns were the most common nationally; this investigation evaluated whether the cluster represented a common-source outbreak or background cases of a common O157 strain.

**Methods:** Patients were interviewed with a routine detailed exposure questionnaire, including brands and purchase locations of foods consumed during the week before illness onset. A case-control study was conducted to evaluate specific exposures. Cases were defined as Minnesota residents with illness onset after April 20, 2007 and culture-confirmed O157 infection with the outbreak subtype. Three age-matched community control subjects were enrolled per case-patient. Testing and traceback of implicated products were conducted.

**Results:** We identified seven case-patients. Illness onsets ranged from April 21 to May 4; five (71%) case-patients were hospitalized. Ground beef consumption was not significantly associated with illness (matched odds ratio [MOR]: undefined;  $p=0.997$ ), but consumption of Grocery Chain X ground beef was (MOR: 15.0; 95% confidence interval, 1.75–128.4;  $p=0.013$ ). The O157 outbreak subtype was isolated from Chain X ground beef from two case-households. On May 10, the implicated slaughter plant recalled 117,500 pounds of beef.

**Conclusions:** We identified an O157 outbreak associated with retail ground beef consumption. Although a limited number of cases having a common PFGE subtype were initially reported, MDH's process of routine, real-time PFGE subtyping, combined with routine interviewing with detailed food-exposure questions, resulted in rapid outbreak detection and food product recall.

**Keywords:** *Escherichia coli* O157:H7, meat products, outbreak

## Poster 2

### Outbreak of *Salmonella enterica* Serovar Typhimurium Associated with a Postwedding Celebration — Virginia, 2007

**Authors:** Katie M. Kurkjian, D. Woolard, D. Kalunian, A. De, G. Addo-Ayensu, R. Varghese

**Background:** Each year, approximately 76 million U.S. residents become sick after eating contaminated food. In July 2007, the Fairfax County (Virginia) Health Department was notified of multiple cases of gastrointestinal illness among persons who had attended a postwedding celebration. We investigated this outbreak to identify the cause and risk factors associated with illness.

**Methods:** We conducted a retrospective cohort study, environmental inspections, and laboratory analysis of stool specimens and leftover foods. A case was defined as illness in a person who had attended the event and had either a laboratory-confirmed *Salmonella* Typhimurium stool specimen or experienced vomiting or diarrhea and two or more of the following symptoms: nausea, abdominal cramps, fever, headache, or fatigue.

**Results:** Thirty-three (63%) of 52 survey respondents met the case definition. Among the patients, diarrhea (97%), fever (94%), and cramps (88%) were the most common self-reported symptoms. Multiple sources, including two restaurants, provided food for the event. Foods were consumed throughout a 5-hour period. The chicken kebab appetizer from Restaurant A was the food item most strongly associated with illness (multivariate relative risk: 3.5; 95% exact confidence interval 1.2–14.5;  $P = 0.02$ ). A positive dose-response association was present (Cochran-Armitage trend test;  $P = 0.03$ ). Multiple critical violations at Restaurant A were identified during the environmental investigation. In laboratory analysis, *Salmonella* Typhimurium was cultured from leftover chicken kebabs, vegetable samosas, and stool specimens from 11 (61%) of 18 patients.

**Conclusions:** This outbreak likely resulted from eating contaminated chicken. Restaurant factors and improper temperature maintenance at the event likely contributed to bacterial contamination and multiplication. Education messages about food safety should include guidelines for food handling for restaurateurs, caterers and private citizens.

**Keywords:** *Salmonella* Typhimurium, *Salmonella* infection, food poisoning, gastroenteritis

## Poster 3

### Vibriosis Epidemiology and Lack of Patient Knowledge of Disease — Maryland, 2002–2006

**Authors:** Rakhee S. Palekar, D. Blythe, M. Davenport

**Background:** Vibriosis, caused by nontoxigenic *Vibrio cholera* species, results in gastrointestinal, dermatological, or systemic illness. Although most infections are self-limited, persons with liver disease (LD) or immunosuppression have increased risk for death. Vibriosis has been reportable in Maryland since 2002, but limited epidemiologic disease assessment has occurred. We analyzed reported cases to characterize vibriosis epidemiology and assessed case-patient knowledge regarding vibriosis risk factors.

**Methods:** All surveillance data for 2002–2006 were reviewed, including case report forms containing clinical and exposure information. Cases had culture-confirmed *Vibrio* species from a clinical specimen. Case-patients from 2006 were reinterviewed by telephone, using a standard questionnaire, to ascertain vibriosis risk factor knowledge.

**Results:** We identified 128 vibriosis cases: 42.2% ( $n=54$ ) gastrointestinal, 24.2% ( $n=31$ ) septicemic, 18.8% ( $n=24$ ) dermatological, and 14.8% ( $n=19$ ) other; 28.9% ( $n=37$ ) had underlying LD or immunosuppression. The overall case-fatality proportion (CFP) was 9.4% ( $n=12$ ). However, for persons with LD or immunosuppression, CFP was 27.0% ( $n=10$ ). Of these 10, a total of 50.0% ( $n=5$ ) reportedly had eaten raw shellfish during the week before illness. Twenty of 30 case-patients from 2006 were successfully contacted and reinterviewed; 95.0% ( $n=19$ ) were unaware that vibriosis can result from consuming raw shellfish or exposing wounds to salt water; of the five case-patients with LD or immunosuppression, only two reported having received physician advice not to consume raw shellfish.

**Conclusions:** In Maryland, fatal vibriosis occurred largely among patients with LD or immunosuppression, many of whom had consumed raw shellfish. The majority of case-patients reinterviewed were unaware of vibriosis exposure risks. These findings demonstrate that public health practitioners should evaluate vibriosis prevention messages and consider means to enhance message delivery, especially for persons at high-risk.

**Keywords:** *Vibrio* infection, prevention, liver disease, immunosuppression

#### Poster 4

### Beaver Fever? Outbreak of Giardiasis Associated with Drinking Water — New Hampshire, 2007

**Authors:** David D. Blaney, E. Daly, J. Manning, J. Stull

**Background:** *Giardia intestinalis* is a frequent cause of sporadic gastroenteritis in the United States and can cause outbreaks. Previous investigations have not confirmed links between animal sources and human illness. In September 2007, the New Hampshire (NH) Department of Health and Human Services initiated an investigation to determine exposure source after notification of two laboratory-confirmed giardiasis cases in a community served by two common wells.

**Methods:** Cases were defined as culture-confirmed giardiasis in a community resident, diagnosed after August 15, 2007. Probable cases exhibited diarrhea without culture confirmation. A standard questionnaire was distributed to water system customers. Stool specimens from ill persons and environmental samples were tested locally and genotyped by CDC.

**Results:** We identified 31 cases (17 confirmed, 14 probable) in 100 residents from 27/43 responding households. Of 63 persons consuming tap water, 27 (43%) reported illness, compared with 3 (9%) of 33 not consuming tap water (risk ratio [RR]=4.7; 95% confidence interval [CI]=1.5–14.4). Drinking  $\geq 4$  versus 0 cups of tap water/day increased illness risk (RR=46.0; 95% CI=5.8–386.7). CDC testing identified identical *G. intestinalis* genotypes in three stool specimens and *G. intestinalis* in one water filter (not genotyped). Of the two wells, one was contaminated with fecal coliforms; CDC testing of an adjacent pond with beaver activity revealed *G. intestinalis* of the same assemblage but different genotype as identified among patients. Beaver trapping and testing is pending. The contaminated well was closed.

**Conclusions:** A nearby pond is suspected to have contaminated a well, causing a communitywide outbreak. Further laboratory studies are underway to confirm the surface water-case link. Placement of wells adjacent to surface water should be avoided to prevent similar outbreaks.

**Keywords:** giardiasis, genotype, disease outbreaks, *Giardia intestinalis*, water, assemblage

#### Poster 5

### Impact of Household Water Treatment and Hygiene Promotion on Diarrhea Among Rapidly Weaned Infants of HIV-Infected Mothers — Kenya, 2005–2007

**Authors:** Julie R. Harris, T. Thomas, S. Greene, R. Ndivo, J. Okanda, R. Quick

**Background:** To reduce mother-to-child HIV transmission in resource-poor settings, WHO recommends exclusive breastfeeding for 6 months, followed by rapid weaning. In the Kisumu Breastfeeding Study (KiBS), babies of HIV-infected mothers receiving antiretroviral therapy experienced high diarrhea rates after rapid weaning; diarrhea is a leading cause of infant deaths in the developing world. Beginning in August 2005, all mothers enrolled in KiBS were given hygiene education, bleach for water treatment, and safe water storage vessels. We assessed the effectiveness of this intervention in reducing infant diarrhea.

**Methods:** We compared the incidence of clinic visits for diarrhea in 0–12 month-old infants enrolled in KiBS before and after implementation of the water and hygiene intervention. We assessed mothers' adherence to the intervention by testing water stored in the home for residual chlorine.

**Results:** We enrolled 230 infants before and 254 infants after implementing the water and hygiene intervention. Among breastfed 0–6 month-old infants, diarrhea risk was lower (RR = 0.51, 95% CI 0.35–0.74) in the post-intervention period (August 2005–January 2007) than in the pre-intervention period (August 2003–July 2005); among rapidly weaned 7–12 month-old infants, there was no difference in risk (RR = 0.94, 95% CI 0.61–1.47). Of 605 water samples tested during home visits to KiBS infants enrolled after evaluation of the safe water intervention began, 516 (83%) had detectable chlorine residuals; adherence was unrelated to diarrhea risk.

**Conclusions:** Despite high adherence of mothers to recommended water treatment practices, post-weaning diarrhea risk was similar in infants enrolled before and after implementation of the water and hygiene intervention. To reduce diarrhea risk after rapid weaning in babies of HIV-infected mothers, more comprehensive household hygiene interventions may be required.

**Keywords:** HIV, diarrhea, hygiene, water, weaning

## Poster 6

### Outbreak of Giardiasis at a Boy Scout Camp — California, 2007

**Authors:** Amy E. Karon, K. Hanni, J. Mohle-Boetani, R. Beretti, S. Johnston, L. Xiao, K. Meyer, D. Vugia

**Background:** *Giardia duodenalis*, one of the most prevalent intestinal parasites in the United States, is commonly waterborne. In August 2007, we investigated a giardiasis outbreak at a Boy Scout Camp to identify infection source and implement control measures.

**Methods:** Five weeks after the outbreak began, we conducted a retrospective cohort study among camp attendees (scouts, parents, and staff) from the suspected exposure period. Patients were attendees with laboratory-confirmed giardiasis or  $\geq 3$  loose stools/day for  $\geq 5$  days. We tested water samples, interviewed kitchen workers, and evaluated the septic system.

**Results:** We interviewed 253/318 (80%) camp attendees; 42 (17%) met the patient criteria, including 30/92 (33%) parents, 3/25 (12%) staff, and 9/136 (7%) scouts ( $P < 0.0001$ ). Most (81%) ill scouts and parents attended during July 5–8; illness onset clustered during July 7–23. Bivariate analyses associated illness with eating garden salad (risk ratio [RR]=3.3; 95% confidence interval [CI]=1.3–8.5) and showering (RR=1.9; 95% CI=1.1–3.3). Most (93%) parents ate garden salad, precluding a useful multivariable analysis. On July 6, one week after a new sand-filtration system was installed, water testing indicated elevated total coliforms and turbidity; *Giardia* testing was not performed. On August 14, sand-filtered water tested negative for *Giardia*; total coliforms and turbidity were unremarkable. Neither ill food handlers nor septic cross-contamination was documented.

**Conclusions:** A giardiasis outbreak at a scout camp affected adults more than children. The epidemic curve indicates a point source; no specific vehicle was identified. The camp reopened under a boil-water order. Delayed outbreak investigation might have affected epidemiologic and environmental data quality, making the determination of a waterborne outbreak difficult. We are evaluating timeliness of waterborne outbreak reporting in California.

**Keywords:** *Giardia duodenalis*, waterborne, outbreak, water microbiology

## Poster 7

### Barriers To Maintaining the Microbiologic Quality of Drinking Water, South Sulawesi, Indonesia — Bantaeng and Maros Districts, 2007

**Authors:** Samir V. Sodha, M. Menon, K. Trivedi, A. Ati, M.E. Figueroa, R. Ainslie, K. Wannemuehler, R. Quick

**Background:** In Indonesia, diarrhea remains a major cause of morbidity and mortality among children  $< 5$  years despite 50 years of intensive government promotion of boiling drinking water. For many populations, boiling is expensive, time-consuming, and environmentally destructive. In preparation for implementation of a point-of-use water chlorination program, we assessed impact of boiling on water quality in South Sulawesi.

**Methods:** We surveyed a random sample of households with  $\geq 1$  child under 5 years in 39 villages in 2 rural districts about demographic and socioeconomic characteristics, water sources, storage, and treatment practices. We tested source and stored water samples from a random sample of 20% of households for *Escherichia coli* contamination.

**Results:** We enrolled 1,205 households with 1,468 children  $< 5$  years. Over 70% of respondents used tap water; all stored water in the home and 84% reported boiling drinking water. Water samples were obtained from 242 households; 96% of source water and 51% of stored water samples yielded *E. coli* (44% of boiled water samples; 89% of unboiled samples). Water that was reportedly not boiled (RR=2.0, 95% CI=1.7-2.5), stored in wide-mouthed (RR=1.4, 95% CI=1.1-1.8) or uncovered (RR=1.8, 95% CI=1.3-2.4) containers, or stored in households in the three poorest socioeconomic quintiles (RR=1.4, 95% CI=1.1-1.9) was more likely to yield *E. coli*. A multivariate model, controlling for district, showed that water contamination was independently associated with not boiling (OR=6.8, 95% CI=3.2-14.4) and living in the 3 poorest quintiles (OR=1.8, 95% CI=1.1-3.1).

**Conclusion:** *E. coli* contamination of stored water was more likely in households that did not boil and were poor. For these households, chlorine-based water treatment, which is less expensive, may offer an acceptable alternative approach to disease prevention.

**Keywords:** *Escherichia coli*, diarrhea, water microbiology, Indonesia

## Poster 8

### Investigation of a *Campylobacter* Outbreak Associated with Eating Cheese Made from Unpasteurized Milk — Kansas, 2007

**Authors:** Titilayo S. Aghoghovbia, C. Banez Ocfemia, D.C. Hunt

**Background:** *Campylobacter* is the second most common cause of foodborne gastrointestinal illness in the United States and might account for 40% of Guillian-Barré syndrome cases, a condition associated with substantial morbidity and mortality. In October, *Campylobacter jejuni* gastrointestinal illness was detected among residents of a community (approximately 150 persons) attending an event. We investigated the outbreak to determine the cause, risk factors for illness and to recommend control measures.

**Methods:** A case was defined as vomiting (any) or diarrhea (three or more loose stools/day) in a community member with onset during October 20–30. We conducted a retrospective cohort study by using a self-administered questionnaire, including information about 12 food items. Statistically implicated items were investigated further. Patient stool samples were tested. A subset of *C. jejuni* isolates was genotyped by pulsed-field gel electrophoresis (PFGE).

**Results:** Of approximately 150 attendees, 130 responded. Sixty-eight (52%) patients met the case definition. Patients were aged 1–75 years (median: 25 years); 37 (54%) were female. Demographic characteristics of ill and nonill attendees were not statistically different. Nineteen (28%) patients sought medical care, including two (3%) hospitalized women aged 28 and 45 years. Only eating cheese that had been made from unpasteurized milk (risk ratio: 13.9; confidence interval, 2–94) was associated with illness. *C. jejuni* was isolated from the four stool samples; of two tested isolates, the PFGE pattern was indistinguishable. Donated unpasteurized milk from one dairy was used to make the feast cheese on-site.

**Conclusions:** The outbreak was associated with eating cheese made from unpasteurized milk. We recommend that the state departments of agriculture and health consider revising regulations to limit the sale and donation of unpasteurized milk.

**Keywords:** *Campylobacter*, outbreak, unpasteurized milk, cheese, foodborne

## Poster 9

### *Salmonella* Typhimurium Outbreak Associated with Raw Milk and Cheese Consumption — Pennsylvania, 2007

**Authors:** Tai-Ho Chen, L. Lind, A. Weltman, M. Moll, W. Chirdon, E. Campagnolo, V. Urdaneta, S. Ostroff

**Background:** *Salmonella* causes an estimated 1.4 million illnesses annually in the United States. In February 2007, two *Salmonella enterica* subtype Typhimurium cases with identical pulsed-field gel electrophoresis (PFGE) patterns were identified through routine electronic laboratory reporting. We conducted an investigation to determine the source of the outbreak and to prevent further transmission.

**Methods:** We defined a case as diarrheal illness with onset during February–September 2007, in a Pennsylvania resident with *S. Typhimurium* PFGE-matched to the outbreak pattern. We reviewed Pennsylvania National Electronic Disease Surveillance System reports to identify additional cases. Patients were interviewed to identify potential exposures. Raw milk samples from an implicated dairy (Dairy A) and households of ill persons were tested for pathogens.

**Results:** We identified 29 cases from five Pennsylvania counties with onsets during February–July 2007. Median age was 6 years (range: 5 months–76 years); 17 (59%) were male. Fourteen (48%) reported having consumed Dairy A raw milk. Additionally two (7%) had drunk raw milk of unknown origin; four (14%) had consumed illegally produced queso fresco (three from Dairy A raw milk, one source unknown); two (7%) were infants living in households with Dairy A raw milk. The *S. Typhimurium* outbreak strain was isolated from raw milk from Dairy A and from two households of ill persons. Dairy A's raw milk permit was revoked. No new cases have been identified.

**Conclusions:** Raw milk from Dairy A was the source of this outbreak. With an increase in Pennsylvania raw milk permits since 2005, the public should be informed about the health risks of raw milk consumption. To prevent *Salmonella* and other infections, consumers should refrain from consumption of raw milk.

**Keywords:** disease outbreaks, *Salmonella* infections, milk, cheese

## Poster 10

### Outbreak of *Campylobacter jejuni* Associated with Unpasteurized Milk — South Carolina, 2007

**Authors:** Kira A. Christian, P. Curry, M. Davis, M. Headrick, C. Kanwat, E. Mays, M. O'Brien, J. Schlegel

**Background:** *Campylobacter* is a common cause of diarrheal illness in the United States. On May 25, 2007, a local epidemiologist in northwest South Carolina (SC) informed the SC Department of Health and Environmental Control (DHEC) of an increased number of *Campylobacter jejuni* infections. Initial investigation indicated those affected might have consumed unpasteurized milk. We conducted an investigation to determine the source of infection and prevent additional cases.

**Methods:** We conducted a case-control study. A case was defined as diarrheal illness with a positive *Campylobacter* stool culture in a resident of any of four SC counties during April 25–June 25, 2007. Control subjects were selected by using a neighborhood random-digit–dialing protocol. Data were analyzed using exact logistic regression with median unbiased estimates. *Campylobacter* isolates submitted to SC Bureau of Laboratories (BOL) were typed by pulsed-field gel electrophoresis (PFGE).

**Results:** Nineteen cases were identified (median age: 55 years; range: 1–78 years) during April 25–June 25, 2007. Unpasteurized milk originating from Dairy A was consumed by 11/19 case-patients (odds ratio [OR]: 62.6; exact 95% CI, 9.00–infinity); 8/19 case-patients (OR: 3.88; CI, 0.90–16.6) reported attending a local flea market where unpasteurized Dairy A milk was sold. On multivariable analysis, unpasteurized Dairy A milk consumption remained significant (adjusted OR: 73.3; CI, 8.50–infinity). Seven cultures confirmed by SC BOL yielded *Campylobacter jejuni*; PFGE patterns were indistinguishable on four of five isolates.

**Conclusion:** This *Campylobacter* outbreak was associated with the consumption of unpasteurized milk; the sale of unpasteurized milk is legal in SC. DHEC reviewed the risks of unpasteurized milk consumption with Dairy A. State and local health departments should work to educate the public and dairy farmers.

**Keywords:** *Campylobacter*, milk, gastroenteritis, dairy, disease outbreaks

## Poster 11

### *Salmonella enterica* Subtype Montevideo Infections Associated with a Fast Food Restaurant — Georgia, 2006

**Authors:** Petra Wiersma, C. Burnett, C. Shuler, R. Manning, C. Sheeley, A. Johnson, T. Williams, C. Drenzek

**Background:** *Salmonella* is an important foodborne pathogen. During August–November 2006, a total of 46 *Salmonella* Montevideo infections with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns were identified among residents of City X, Georgia. The Georgia Division of Public Health initiated an investigation to identify the source of the infections and to prevent additional cases.

**Methods:** A case was defined as a *Salmonella* Montevideo infection with the PFGE pattern J1XX01.0011 in a Georgia resident during August 18–November 15, 2006. Patient residences were mapped by using GIS ArcView 3.2. A foodborne disease questionnaire was administered to patients. An environmental investigation was conducted at an implicated City X restaurant; food and environmental samples were submitted for bacterial culture.

**Results:** We identified 72 cases; 60% of patients were female and 86% were white. Median age was 23 years (range: 18 months–83 years). Nineteen patients (26%) were hospitalized; no deaths occurred. Forty-three of the 52 interviewed patients (83%) reported eating at Restaurant A before illness onset; this number included persons not residing in City X who reported having eaten at Restaurant A. *Salmonella* Montevideo was cultured from a Restaurant A meat slicer blade and sliced roast beef; no other samples tested positive. The PFGE patterns were indistinguishable from patient isolates. After replacement of the meat slicer, no additional cases were identified.

**Conclusions:** A contaminated Restaurant A meat slicer was the probable source of this outbreak. Prompt intervention prevented additional cases. Serotyping and PFGE analysis of *Salmonella* isolates, timely interview of patients, and environmental evaluation of the restaurant were critical in identifying the exposure source.

**Keywords:** *Salmonella*, serotype Montevideo, serotyping, PFGE typing

## Poster 12

### Coccidioidomycosis: Knowledge, Attitudes, and Practices Among Health Practitioners — Arizona, 2007

**Authors:** Sanny Y. Chen, R. Miramontes, S. Anderson, L. Erhart, K. Komatsu, B. Park, T. Chiller, R. Sunenshine

**Background:** Coccidioidomycosis, the third most commonly reported infectious disease in Arizona, causes an estimated one-third of community-acquired pneumonias in Arizona, although <15% of pneumonia cases are tested for this disease. To direct future educational efforts, we assessed health practitioners' knowledge, attitudes, and practices (KAP) regarding diagnosis and treatment of coccidioidomycosis in Arizona.

**Methods:** Surveys were mailed to 7,978 health practitioners licensed by the Arizona medical, osteopathic, and nursing boards during October–December 2007. Four basic questions assessed general knowledge, and nine clinical scenarios evaluated treatment attitudes and practices.

**Results:** Respondents were more likely to be physicians and from the Tucson area than nonrespondents. Of 750 (9.4%) who completed the survey, 57% were physicians and 22% were nurse-practitioners. Median age was 51 years (range: 29–87), and the median number of years practicing medicine in Arizona was 12 (range: <1–59). Only 23% correctly answered all four knowledge questions, and an additional 19% correctly answered three of four. Of 485 (65%) respondents who reported providing care to coccidioidomycosis patients, only 17% managed all treatment case scenarios appropriately. Approximately half reported “nearly always” testing patients presenting with community-acquired pneumonia for coccidioidomycosis; 13% reported “nearly always” treating any new diagnosis without evidence of comorbidities; and 21% reported “nearly always” treating any patient requesting treatment.

**Conclusions:** This KAP study, the first for coccidioidomycosis performed in the United States, had a low response rate. Multiple attempts to contact nonrespondents should be considered to increase generalizability. Despite the high incidence of coccidioidomycosis in Arizona, general knowledge and medical practices are inadequate, which underscores the need for a comprehensive education campaign to improve appropriate diagnosis and treatment of this disease in Arizona.

**Keywords:** coccidioidomycosis, fungus, KAP survey, community-acquired pneumonia, lung disease

## Poster 13

### Nosocomial Transmission of Newly Identified Adenovirus Serotype 14 Among Healthcare Workers Caring for Patients with Severe Pneumonia — Oregon, 2007

**Authors:** Philip L. Gould, H. Clayton, A. Balaji, J. Jackson, L. Tsaknaridis, X. Lu, D. Erdman, A. Thomas, L. Grenz, M. Cortese, A. Srinivasan, P. Lewis, L. Anderson, D. Gilbert

**Background:** Adenovirus type 14 (Ad14), a rarely identified serotype, was isolated from several severe pneumonia patients in Portland, OR in early 2007. At one hospital, an intensive care unit (ICU) healthcare worker (HCW) developed severe Ad14 pneumonia. We investigated the extent of Ad14 infection among the hospital's HCWs and risk factors for infection.

**Methods:** Three cohorts were recruited: personnel from ICUs and units where Ad14 pneumonia patients were treated (“high-exposure”), personnel in brief contact with Ad14 patients, e.g. emergency department staff (“low-exposure”), and personnel with no pneumonia patient contact (“unexposed”). HCWs were offered serology testing and polymerase chain reaction (PCR) testing of respiratory swabs for evidence of Ad14 infection. Tested HCWs completed a questionnaire on symptoms and risk factors, including infection control practices. A case of Ad14 infection was defined as a HCW with Ad14 neutralizing antibody titer  $\geq 1:40$  or positive Ad14 PCR from respiratory swabs.

**Results:** Of the high-exposure, low-exposure and unexposed cohorts, respectively, 124/199 (62%), 43/168 (26%), and 42/166 (25%) were tested. Eighteen (9%) met the case definition: 17 (94%) by serology, 1 (6%) by PCR. Fourteen (11%) of 124 high exposure participants met the case definition as did 4 (9%) of the 43 low exposure participants; none of the unexposed participants were cases. Case status was associated with febrile respiratory illness (RR 3.2, 95% CI 1.3–7.9), contact with ill coworkers with pneumonia (RR undefined,  $p < 0.001$ ), but not contact with ill family members (RR 1.0, 95% CI 0.4–2.8). Twelve cases (67%) reported working while ill.

**Conclusions:** The findings support nosocomial acquisition of Ad14. HCWs with febrile respiratory illness should be excluded from work to reduce transmission of pathogens, including Ad14.

**Keywords:** adenovirus infection, respiratory infection, healthcare personnel

**Poster 14**  
**Asthma Prevalence by Urban-Rural Status —**  
**United States, 2005**

**Authors:** Teresa A. Morrison, D. Callahan, J. Moorman, C. Bailey

**Background:** Approximately 20 million persons in the United States have asthma. Identifying populations with high asthma prevalence focuses resources to reduce disease burden. Although geographically narrow studies suggest that asthma prevalence is higher in urban versus rural areas, a multi-state urban-rural comparison has not been done. We analyzed data from a national survey to determine prevalence by urban-rural status.

**Methods:** We linked the 2005 Behavioral Risk Factor Surveillance System (BRFSS) to Urban Influence Codes (UIC) from the U.S. Department of Agriculture. BRFSS is an annual state-based telephone survey that uses a disproportionate stratified sampling plan to collect health data from non-institutionalized adults. In 2005, all 50 states asked about asthma. UICs categorize counties based on population size and adjacency to metropolitan areas. We classified these UIC categories into four groups (metropolitan, adjacent-metropolitan, micropolitan, and remote) to define urban-rural status. By using SUDAAN, we calculated weighted estimates for complex sample design and multivariate logistic regression to generate adjusted odds ratios (ORs) for the association between current asthma and urban-rural status while controlling for sociodemographic and health behaviors.

**Results:** Overall asthma prevalence was 7.9% (95%CI=7.73–8.08). Although asthma prevalence was highest among micropolitan residents (8.6%; 95%CI=7.84–9.36) and lowest among metropolitan residents (7.8%; 95%CI=7.65–8.05), prevalence across urban-rural categories was not statistically different ( $p < 0.28$ ). After we adjusted for sociodemographic and health behaviors, adjacent metropolitan (OR=0.91; 95%CI=0.85–0.97) and remote (OR=0.87; 95%CI=0.78–0.98) residents were less likely to report current asthma compared to metropolitan residents.

**Conclusions:** Current asthma prevalence is as high in rural areas as in urban areas. Characteristics unique to residence impact disease burden. Allocating resources to address these environmental influences may reduce asthma prevalence.

**Keywords:** asthma, rural population, urban population, Behavioral Risk Factor Surveillance System, cross-sectional studies

**Poster 15**  
**Influenza Among Outpatient Children —**  
**United States, 2007**

**Authors:** Vivek M. Shinde, M. Iwane, M. Prill, K. Edwards, P. Szilagyi, M. Staat, M. Griffin, G. Fairbrother, C. Hall, G. Weinberg, L. Finelli

**Background:** Most of the severe influenza morbidity in children occurs in those <5 years-old (~20,000 hospitalizations annually) for whom yearly vaccination is universally recommended. Although older studies suggest that children  $\geq 5$  years-old may have the highest rates of illness, vaccination is recommended only for those with high-risk conditions. Whether all children  $\geq 5$  years-old should routinely receive influenza immunization is currently being debated. We therefore conducted a prospective cohort study to compare influenza burden and vaccination coverage among older and younger children with acute respiratory illness (ARI).

**Methods:** Children <13 years-old residing in three U.S. counties who were seen as outpatients for ARI were enrolled during the 2006–2007 influenza season. Nasal/throat samples were tested for influenza by PCR and demographics and vaccination status were obtained from parental surveys and chart review. For analysis, children were divided into two categories: younger (<5 years) and older ( $\geq 5$  years) children.

**Results:** Ninety-five (20%) of 482 older children and 82 (8%) of 1092 younger children presenting with ARI had laboratory-confirmed influenza ( $p < 0.001$ ). Older and younger children with influenza were similar with regard to race, gender, presence of cough (94% each respectively), and fever (89% vs. 96%) (all  $p$ -values=NS). Only 52 (27%) of 193 older children with an indication for vaccination received at least one dose of influenza vaccine, versus 429 (39%) of 1092 younger children ( $p < .001$ ). Among unvaccinated children: 87 (23%) of 381 older children and 57 (9%) of 663 younger children had influenza ( $p < .001$ ), and 2 (2%) of 87 older and 3 (5%) of 57 younger children required hospitalization for influenza ( $p = .39$ ).

**Conclusions:** Influenza is a more frequent cause of ARI in older than younger children. Although vaccination of all older children could further reduce influenza burden, existing vaccination recommendations in children are not well implemented.

**Keywords:** influenza, vaccination, acute respiratory illness, children

## Poster 16

### Adenovirus Serotype 14 Infection at a Military Training Installation in South Texas, 2007

**Authors:** John R. Su, V. Fonseca, J. Tate, M-A. Widdowson, M. Bunning

**Background:** Acute respiratory disease (ARD, or fever  $\geq 100.5^{\circ}\text{F}$  plus  $\geq 1$  respiratory symptom) associated with adenovirus serotypes 4 and 7 is common among basic military trainees (BMTs). ARD can delay training and deployment of personnel, despite usually being self-limiting. At a military training installation in Texas, 689 ARD cases, including 150 associated with adenovirus serotype 14 (Ad14), occurred during January-June 2007.

**Methods:** BMTs are organized into single-sex groups of 45-60 individuals ("flights"). We reviewed personnel and laboratory databases for BMTs on the installation during January 1-June 25, including BMTs segregated to an isolation flight that opened May 26 to reduce spread and morbidity of ARD. Laboratory testing included polymerase chain reaction and viral culture of throat swabs and nasal washes.

**Results:** Among the 193 male and 67 female flights on the installation, 298 of 488 ARD cases tested had adenovirus. Median attack rate of adenoviral ARD was 2% (range 0-45%) among male and 0% (range 0-6%) among female flights: 47% (91/193) of male compared to 28% (19/67) of female flights had attack rates exceeding 2% (RR=1.66, 95%CI=1.10-2.50). Twenty-seven male flights exceeded the highest female flight attack rate (6%). Of BMTs in the isolation flight, 150/244 (61%) had laboratory data available: 94/133 (71%) male and 2/17 (12%) female BMTs had adenovirus (RR = 6.01; 95%CI=1.63-22.19), with 42 male BMTs and 1 female BMT having Ad14. Associated with Ad14 were 27 hospitalizations and one death.

**Conclusion:** Male BMTs were at elevated risk for ARD associated with Ad14, a rarely reported adenovirus. Identifying risk factors (e.g., biologic or behavioral factors) that might predispose male BMTs to infection with Ad14 would allow targeted interventions to reduce ARD.

**Keywords:** adenovirus, respiratory infection, military personnel, epidemiology (outbreaks)

Monday, April 14, 2008

Session C: Mercy, Mercy, MRSA — MRSA Ravinia Ballroom 1:30 a.m.–3:00 p.m.

Moderators: Scott Fridkin and Jeff Hageman

1:35

### Outbreak of Methicillin-Resistant *Staphylococcus aureus* Among High School Football Players — New York City, 2007

**Authors:** Hemanth Nair, P. Kellner, M. Wong, H. Cook, Z. Rehana, F. Eniola, D. Weiss

**Background:** Athletes playing contact sports are at risk for skin and soft-tissue infections (SSTIs), including methicillin-resistant *Staphylococcus aureus* (MRSA). On September 12, 2007, the New York City Department of Health and Mental Hygiene received a report of a community-associated MRSA cluster among a Brooklyn high school football team. Because infections clustered near the end of a training camp, we investigated whether changes in hygiene practices during camp increased infection risk.

**Methods:** In a retrospective cohort study of team members, confirmed cases were clinically compatible SSTI or systemic infections with positive MRSA culture occurring during 8/1/07-9/30/07; suspect cases were SSTIs occurring during the same period but with no culture taken. Questionnaires administered in one-on-one interviews with players assessed SSTI risk factors.

**Results:** Fifty-one (86%) of 59 players completed questionnaires. We identified four confirmed and two suspect cases (overall attack rate=6/51; 12%). Among respondents, 20% (10/51) and 12% (6/51) shared towels and soap, respectively, during camp; none shared them during the regular season. On bivariate analysis, towel sharing during camp increased SSTI risk (risk ratio=8.2; 95% confidence interval [CI]=1.74-38.64). Mean body mass index (BMI) was higher among cases than noncases (29.1 $\pm$ 4.10 [standard deviation {SD}] versus 23.8 $\pm$ 3.67;  $t=-2.56$ ;  $P=0.014$ ). On logistic regression, BMI remained a risk factor after controlling for towel sharing (BMI adjusted odds ratio [aOR]=1.4; 95%CI=1.05-1.90; towel sharing aOR=15.7; 95%CI=1.48-167.4). Turf abrasions and player position were not significant risk factors.

**Conclusions:** These data indicate that altered hygiene practices during training camps, particularly towel sharing, can contribute to SSTI spread, including MRSA. The link between BMI and sports-related SSTIs requires further study. We recommend that MRSA/SSTI prevention efforts target athletic training camps.

**Keywords:** skin infections, staphylococcal; methicillin resistance; MRSA

1:55

### Methicillin-Resistant *Staphylococcus aureus* Hospitalizations Among the American Indian/Alaska Native Population, 1996–2005

**Authors:** Kathy K. Byrd, R. Holman, M. Bruce, T. Hennessy, J. Wenger, D. Haberling, J. Cheek

**Background:** American Indians and Alaska Natives (AI/ANs) have been reported to have high rates of methicillin-resistant *Staphylococcus aureus* (MRSA) infection. No studies, however, have looked at MRSA infections nationally among this population. We describe MRSA-associated hospitalizations among the ~1.3 million AI/ANs who receive care at Indian Health Service (IHS) healthcare facilities nationwide.

**Methods:** We analyzed hospital discharge data for AI/ANs from the IHS National Patient Information Reporting System from 1996–2005 and the time periods 1996–1998 and 2003–2005. MRSA and methicillin-sensitive *Staphylococcus aureus* (MSSA) crude hospitalization rates were determined using ICD-9-CM codes and calculated as the number of hospitalizations per 100,000 AI/ANs/year. Rates represented discharge diagnoses. The 2005 IHS user population was used to estimate the denominator. Hospitalizations were examined by age-group, gender and region. Rate comparisons were performed using Poisson regression analysis or a two sample test of proportions.

**Results:** Although both MRSA and MSSA-associated hospitalization rates increased throughout the study period, MRSA hospitalizations made up an increasing proportion of total *Staphylococcus aureus* hospitalizations; from 8.5% to 43.6% between time periods. MRSA-associated hospitalization rates increased from 4.6 to 46.8 per 100,000 AI/ANs ( $p < 0.01$ ). MRSA rates increased in all age groups, genders and regions. Persons 85+ years of age had the highest absolute rate increase from 9.4 to 114.1 ( $p < 0.01$ ). Among the five IHS regions, Alaska demonstrated the greatest increase from 3.3 to 88.6 ( $p < 0.01$ ). Cellulitis was associated with 59% of MRSA diagnoses.

**Conclusions:** The MRSA-associated hospitalization rate among AI/AN increased during 1996–2005. Given the increase, clinicians should have a higher index of suspicion for infections caused by MRSA. Further study to determine the proportion of MRSA-associated hospitalizations that are nosocomial versus community-acquired is indicated.

**Keywords:** *Staphylococcus aureus*, methicillin-resistance, American Indian, Alaska Native, hospitalization

2:15

### Investigation of the Eighth Case of Vancomycin-Resistant *Staphylococcus aureus* — Michigan, 2007

**Authors:** Jennie L. Finks, E. Wells, T. Dyke, J. Hageman, S. Haskell, J. Patel, C. Miller

**Background:** Reports of methicillin-resistant *Staphylococcus aureus* (MRSA) infections are increasing. Vancomycin remains a preferred treatment for severe infections; thus, vancomycin resistance has substantial clinical and public health implications. In October 2007, the eighth case worldwide of vancomycin-resistant *S. aureus* (VRSA), the sixth in Michigan, was diagnosed. The Michigan Department of Community Health (MDCH) investigated its source and potential spread.

**Methods:** The patient's medical records were reviewed. Laboratory testing performed by MDCH and CDC included conventional biochemical methods, susceptibility testing, PCR for the *van* genes encoding vancomycin resistance, and comparison with previous VRSA isolates by pulsed-field gel electrophoresis (PFGE). Potential contacts were identified, prioritized, and screened according to CDC recommendations.

**Results:** The eighth patient, a white female aged 47 years, with chronic diabetic foot ulcers, had a history of long-term vancomycin use and concurrent infections with methicillin-resistant, vancomycin-sensitive *S. aureus* and vancomycin-resistant *Enterococcus* (VRE). The VRSA isolate had a vancomycin minimum inhibitory concentration (MIC) = 1,024 g/mL (vancomycin resistance MIC  $\geq 16\mu\text{g/mL}$ ) and as with previous cases, was *vanA*-positive. PFGE differed from other VRSA isolates. To date, 69 swabs were collected from 65 (99%) of the 66 identified contacts. Fifteen (23%) contacts were positive for *S. aureus*. Four (27%) of these were MRSA; none were VRSA.

**Conclusions:** The unique PFGE pattern indicates that VRSA was not transmitted from another known case. Consistent with previous cases, this patient likely experienced VRSA secondary to concomitant MRSA and VRE infections; transfer of vancomycin-resistance from VRE to MRSA has been demonstrated in vitro. Although VRSA transmission has not been documented from this or prior patients, each case provides an opportunity to monitor transmissibility and refine infection control and prevention measures.

**Keywords:** vancomycin resistance, *Staphylococcus aureus*, antimicrobial drug resistance

2:35

**Potential Impact of *Staphylococcus aureus* Vaccine on Invasive Methicillin-Resistant *Staphylococcus aureus* Disease in the United States**

**Authors:** Cynthia A. Lucero, E. Zell, J. Hageman, S.N. Bulens, W. Schaffner and S. Fridkin for CDC ABC surveillance program

**Background:** Methicillin-resistant *Staphylococcus aureus* (MRSA) is an important pathogen causing approximately 94,000 invasive (e.g. bloodstream) infections in the U.S. annually, in both healthcare- and community-settings. Preventing infections requires a multifaceted approach, difficult for healthcare-systems to successfully adopt. Availability of effective vaccine would substantially impact disease burden. This study examines potential impact of vaccination strategies on invasive MRSA disease in the U.S.

**Methods:** Invasive MRSA infections were identified using active, population-based surveillance in 9 States from January 2005–December 2006. Data on recent hospitalizations was also obtained. Data were used in models that estimated impact on MRSA invasive disease incorporating assumptions for vaccine efficacy (50-90%) and coverage (20-70%) during the first year of vaccine use. Vaccine strategies included: strategy 1, all persons  $\geq 65$  years; strategy 2, add persons aged 15-64 after incident invasive MRSA infection; strategy 3, persons  $\geq 65$  years plus persons aged 15-64 upon hospital discharge. Outcomes were measured as number and percentage of infections prevented.

**Results:** 9,543 incident and 1,681 recurrent infections were identified; the average annual U.S. estimate for all invasive MRSA infections was 105,960. 77% of patients with community-onset infections had recent hospitalization. The number of potentially preventable infections was: strategy 1, 12,720-32,270; strategy 2, 14,130-38,310; strategy 3, 17,240-49,940. The percentage of invasive MRSA infections potentially reduced was 12-30% with strategy 1, 13-36% with strategy 2, and 16-47% with strategy 3. The number of infections potentially preventable per million doses administered with strategy 3 alone was 740-1,350.

**Conclusion:** Addition of adults  $< 65$  years with recent hospitalization (strategy 3) increased the number of invasive MRSA infections averted by 55%. Targeting older and hospitalized adults for vaccination may be the most effective strategy for minimizing invasive MRSA infections.

**Keywords:** *Staphylococcus aureus*, staphylococcal infections, staphylococcal vaccines, methicillin resistance

Monday, April 14, 2008

Session D: Safety Dance — Injury

Ravinia Ballroom 3:15–5:20 p.m.

Moderator: Ileana Arias

3:20

**Factors Associated with Fatal All-Terrain Vehicle Crashes — West Virginia, 1999–2006**

**Authors:** Aron J. Hall, D. Bixler, J. Kaplan, J. Kraner, J. Helmkamp

**Background:** Since the 1990s, West Virginia (WV) has led the United States in per-capita death rate from all-terrain vehicle (ATV) crashes, with rates 8 times the national average and continually increasing. We conducted a comprehensive assessment of ATV fatalities to provide critical guidance for community interventions and public health policy to prevent further deaths.

**Methods:** WV death certificates for 1999–2006 with ICD-10 codes correlating to ATV crashes were identified. Population-based death rates for demographic and socioeconomic groups were calculated by using census data. Additionally, data regarding crash circumstances, injuries sustained, and toxicology were abstracted from medical examiner records for 2004–2006 decedents.

**Results:** During 1999–2006, WV ATV fatalities averaged a 14%/year increase, with an overall death rate of 1.49/100,000 population. Elevated annual ATV death rates were observed among males (2.64), adolescents aged 10–19 years (2.84), residents from the most impoverished quartile of counties (2.81), and persons not completing high school among those aged  $\geq 25$  years (2.73). Most fatal ATV crashes occurred in traffic, of which 56% were classified as collisions and 61% resulted in head injuries. Only 15% of decedents were known to be wearing helmets. Alcoholic beverage use was detected in 49% of decedents, of whom 86% had blood-alcohol concentrations  $\geq 0.08$ , WV's legal limit (mean, 0.18).

**Conclusions:** Groups at high risk for ATV fatalities in WV include males, adolescents, residents of impoverished counties, and those without a high school diploma. The prevalence of alcohol abuse and lack of helmet use among ATV decedents indicate two critical areas for targeted interventions among these populations. Restriction of ATV use in traffic, registration requirements, and stricter enforcement of safety regulations should also be considered.

**Keywords:** all-terrain vehicles, accidents, injuries, head trauma, mortality, alcohol

### 3:40 Characteristics of Perpetrators in Homicide-Followed-by-Suicide Incidents: National Violent Death Reporting System — 17 Select States, 2003–2005

**Authors:** Joseph E. Logan, H. Hill, A. Crosby, D. Karch, J. Barnes, K. Lubell

**Background:** Homicide-followed-by-suicide (homicide-suicide) incidents rarely occur but can lead to mass casualties. A better understanding of the perpetrators may provide insight into the nature of these violent acts as well as identify potential opportunities for prevention.

**Methods:** Using 2003–2005 data from the National Violent Death Reporting System, this study: (1) characterizes perpetrators by various types of homicide-suicides (typology based on the perpetrator-victim relationship); and, (2) compares perpetrators to other suicide victims by sex on contextual information gathered from multiple data sources (e.g., coroner/medical examiner and police reports) using odds ratios adjusted for age and race/ethnicity (AORs).

**Results:** Most incidents were intimate-partner-related (n=304); filicide (killing of children)-suicides (n=33) and extrafamilial homicide-suicides (n=42) were less common. Homicide-suicides were mostly committed with firearms (88.2%) and by males (91.4%), those over 19 years of age (97.6%), and those of White race (77.0%); however, a high proportion of filicide-suicides (51.5%) were perpetrated by females. Compared to male suicide victims, male homicide-suicide perpetrators were less likely to have mental health problems (AOR: 0.3; 95%CI: 0.2–0.4) but more likely to have intimate-partner problems (AOR: 3.6; 95%CI: 2.9–4.5). Of the 191 male perpetrators who had intimate-partner problems and committed the act via firearm (46.8% of total), 75 (39.3%) committed the act in retaliation to a breakup and 34 (17.8%) had recently been in court for a family dispute or received a restraining order.

**Conclusions:** The results suggest the potential importance of prevention strategies that focus on defusing intimate-partner separations (e.g. counseling, access to family shelters). Also, during domestic legal proceedings, court/legal officials may be able to play a role in prevention by evaluating access to firearms, assessing domestic violence, and mandating psychiatric counseling.

**Keywords:** homicide-suicide; murder-suicide; intimate partner violence

### 4:00 Injury Risk Among Pickup Truck Drivers — Kentucky, 2000–2004

**Authors:** Suzanne F. Beavers, L. Yu, M. Singleton, S. Robeson, D. Thoroughman, L. Beck

**Background:** Approximately 300,000 persons are involved in 150,000 motor vehicle collisions (MVCs) annually in Kentucky. Pickup truck (PT) drivers have a history of low seatbelt use; knowledge is limited regarding MVCs for this group in Kentucky. We analyzed records from Kentucky's Crash Outcome Data Evaluation System (CODES) to determine if PT drivers in MVCs were at greater risk for severe outcomes and to identify modifiable risk factors.

**Methods:** We evaluated CODES data for 1,130,377 drivers in Kentucky MVCs during 2000–2004. Vehicles were classified as cars, PTs, sports utility vehicles, or vans; heavy vehicles were excluded. We used polytomous logistic regression to examine the relationship between outcome (death, hospitalization, other) and vehicle type, controlling for victim age and recognized MVC risk factors.

**Results:** The dataset contained 224,382 PT drivers (median age: 40.4 years; 84.5% male); 9.3% of PT drivers were not wearing a seatbelt compared with 6.3% of car drivers (Odds Ratio [OR]=1.6, 95%Confidence Interval [CI]=1.56–1.61). Within one month of the MVC, 0.3% of PT drivers died. On regression modeling, (referent=car), driving a PT was inversely associated with death (OR=0.7, 95%CI=0.7–0.8) and hospitalization (OR=0.8, 95%CI=0.8–0.8). Modifiable risk factors included high-speed collisions (death, OR=3.7, 95%CI=3.4–4.1, hospitalization, OR=2.1, 95%CI=2.0–2.2) and driving while intoxicated (death, OR=1.4, 95%CI=1.2–1.5; hospitalization, OR=2.0, 95%CI=1.9–2.1); seatbelt use was protective (death, OR=0.1, 95%CI=0.1–0.1; hospitalization, OR=0.3, 95%CI=0.2–0.3).

**Conclusions:** Controlling for other risk factors, PTs offered greater protection against severe outcomes than cars. However, PT drivers were less likely to wear seatbelts than car drivers. Public health interventions for Kentucky PT drivers should address non-use of seatbelts to increase their protection in an MVC.

**Keywords:** collision, motor vehicle; seat belts; Kentucky; pickup trucks

4:20

**Counting the Burden of Motor-Vehicle–Related Whiplash Injury Using Multiple Diagnoses. Does It Make a Difference? A National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP) Special Study**

**Authors:** John Halpin, A. Greenspan, J.L. Annet, T. Haileyesus

**Background:** Whiplash injury is the most common non-fatal injury occurring among motor vehicle occupants surviving crashes in the United States, accounting for over 900,000 emergency department (ED) visits each year, at a cost of \$19 billion per year. A primary source for estimating the burden of whiplash is the National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP), a nationally representative sample of U.S. EDs. The purpose of this study was to determine if whiplash has been undercounted by NEISS-AIP because it captures only the principal diagnosis and body part injured.

**Methods:** We expanded the data collected at 15 NEISS-AIP hospitals in 2004 to include up to five injury diagnoses/body parts for occupants involved in motor-vehicle crashes. To calculate the total burden of whiplash, defined as strain/sprain injury to the neck, we used weighted data to summate each diagnosis of whiplash among five potential diagnoses per case. Results were stratified by age group and rank of diagnosis.

**Results:** Based on 6,474 total cases utilizing multiple diagnoses, an estimated 1,126,207 persons (95% CI 519,300-1,733,113) with whiplash were treated in U.S. EDs in 2004, constituting an 18% increase over traditional NEISS-AIP estimates. The percentage increase was greatest among the elderly (55+), rising 22% in this age group. Over 83% of extra burden was obtained from the second injury diagnosis alone.

**Conclusions:** Total ED-treated whiplash injury has been underestimated by the NEISS-AIP, particularly in the elderly. The addition of a secondary diagnosis/body part to NEISS-AIP cases could correct the majority of this undercount. Based on the results of this study, it is possible that other injuries have been undercounted by the NEISS-AIP as well, meriting further study.

**Keywords:** whiplash, motor-vehicle, occupant, non-fatal injury

4:40

**Prevalence of Rollover Protective Structures (ROPS) on Farm Tractors — United States, 2001 and 2004**

**Authors:** Kelly A. Loring, J. Myers

**Background:** Tractor overturns are the leading cause of occupational death in the agricultural production industry, causing approximately 101 deaths per year between 1992 and 2005. Rollover protective structures (ROPS) are estimated to be 99% effective in preventing rollover fatalities. In 1993, it was estimated only 38% of the 4.8 million farm tractors had ROPS. Current ROPS prevalence data was needed.

**Methods:** Telephone surveys conducted in 2001 (n=15,259; 61% response) and 2004 (n=16,239, 65% response) asked randomly-sampled farm operators how many tractors were on their farm and how many had ROPS. Survey results were weighted based on 2001 and 2004 Census of Agriculture farm counts, stratified by value of sales within geographic regions. An Analysis of Variance linear regression model was constructed with percentage of tractors with ROPS as the dependent variable and year, value of sales, operator age, full/part time operation, acreage, and region as independent variables. 2001 and 2004 data were combined to estimate tractors and ROPS use for the independent variables.

**Results:** In 2001, 46% (95% CI=45-47) of 4.2 million farm tractors were equipped with ROPS and, in 2004, 51% (95% CI=50-52) of 4.0 million farm tractors had ROPS. ROPS use was related to operator age (p=0.0007), value of sales (p=0.0003), full/part-time operation (p<0.0001), and acreage (p=0.0215).

**Conclusions:** Only half of all farm tractors have ROPS despite most tractors manufactured since 1986 having rollover protection and the availability of retrofits for many older tractors. The identification of operator age and smaller farm operations as a significant risk factor for lack of ROPS use suggests interventions, such as tractor retirement programs and educational efforts, should be targeted toward older farmers and smaller farms.

**Keywords:** agriculture, ROPS, tractors, rollovers, retrofitting, injury

**5:00**  
**Unintentional Strangulation Deaths Among Children and Adolescents: The “Choking Game” — United States, 1995–2007**

**Authors:** Robin L. Toblin, L. Paulozzi, J. Gilchrist

**Background:** The media have recently reported a number of deaths of children from playing the “choking game,” which is an attempt to obtain a brief euphoric state by strangling oneself using a noose or being strangled by another person. One YRBS survey indicated that 11% of children 12-18 years old reported playing the game. This is the first investigation of the number and characteristics of those dying due to this activity.

**Methods:** Using “choking game” and its aliases as search terms, we conducted a LexisNexis search of newspapers back to the 1970s. We also conducted a Google search of additional victims’ names listed on choking game awareness websites to find supporting media reports. We defined a case as a death resulting from an activity described as the “choking game” or any of its aliases. Only U.S. residents 5-19 years of age who died in the United States were included.

**Results:** We identified 81 deaths, of which 69.1% occurred in 2005-2006. The earliest identified death occurred in 1995. Most decedents were male (86.4%). The age range was 6-17 years (mean = 13.2 ± 2.1). Nearly all decedents had been playing alone at the time of death (95.3%). Incidence did not vary by region, season, or day of week.

**Conclusions:** Our research suggests that the risk of dying from the “choking game” is greatest for boys in early adolescence who play alone. Reliance on media reports probably underestimates the magnitude of the problem. Health-care providers, educators, and parents should become aware of this activity and respond to warning signs related to it. Death investigators should be aware of this game as an alternative explanation for apparent suicides.

**Keywords:** wounds and injuries, death, choking, asphyxia, risk-taking, adolescent behavior

**Tuesday, April 15, 2008**  
**Concurrent Session E-1: The Tide Is High — Recreational Water**  
**Ravinia Ballroom 8:30–10:15 a.m.**  
**Moderator: Michael Beach**

**8:35**  
**Up the Creek Without a Personal Flotation Device: Paddle Sports–Related Fatalities — Maine, 2000–2007**

**Authors:** J. Eric Tongren, A. Johnson, A. Pelletier

**Background:** Vessel sales for recreational paddle-sports (canoeing, kayaking, and rafting) have increased 34% during 2001–2006 while paddle-sports–related fatalities have increased 33%. Although the United States Coast Guard (USCG) tracks boating fatalities, information is lacking regarding paddle-sports, which comprise the largest growing segment of the boating market. The objective of this study was to examine paddle-sports–related fatalities in Maine to determine possible prevention strategies.

**Methods:** We compiled case-series reports of paddle-sports–related fatalities in Maine for 2000–2007. Cases were identified by vital statistics (ICD-9 codes: W69, W74, and V905–928), the state medical examiner, and USCG. Additional information on cases was obtained through the Maine Department of Inland Fisheries and Wildlife and newspaper accounts.

**Results:** We identified 38 paddle-sports–related fatalities, for a rate of 4.2 deaths/1,000,000 persons/year. Twenty-two (58%) cases were associated with canoes, 12 (32%) with kayaks, and 4 (11%) with rafts. Thirty-one (82%) persons drowned after capsizing. Twenty-one (55%) fatalities occurred on lakes, 13 (34%) on rivers, and 4 (11%) on the ocean. Males constituted 92% (n = 35) of fatalities. Twenty-six (68%) decedents did not use personal flotation devices (PFDs), chiefly among canoe-associated fatalities (21/22 [95%]). Seven (18%) decedents tested positive for alcohol; five had a blood alcohol concentration ≥0.08 mg/dL. Thirty-five (92%) fatalities occurred during May–October.

**Conclusion:** Deaths were primarily the result of drowning after capsizing, highlighting the unstable nature of these vessels. PFD nonuse and alcohol use were common among paddle-sports–related fatalities. Boating education should focus on PFD use, alcohol awareness, and the inherent instability of paddle-sports vessels.

**Keywords:** paddle-sports, canoe, kayak, raft, personal flotation devices (PFDs), deaths

8:55

### Cryptosporidiosis Outbreak Associated with an Interactive Splash Park — Idaho, 2007

**Authors:** Randall J. Nett, K. Carter, R. Jue, T. Schmalz

**Background:** *Cryptosporidium*, a parasite capable of causing severe diarrheal illness, affects an estimated 60,000–300,000 persons annually in the United States and is associated with contaminated recreational water. In August 2007, we investigated an outbreak of gastrointestinal illness associated with Splash Park A and an adjacent drinking fountain to identify risk factors for illness and recommend control measures.

**Methods:** We developed a case definition and conducted case-finding, a case-control study of visitors attending reserved picnic parties at Splash Park A during July 23–August 10, 2007, and an environmental investigation.

**Results:** Fifty-one (33.1%) of 154 persons contacted from the reservation listing met the case definition for cryptosporidiosis. Case-patients were more likely than control-subjects to have been exposed to the splash park water (odds ratio: 10.3; 95% confidence interval [CI], 3.8–28.1) and potable fountain water (odds ratio: 3.6; 95% CI, 1.4–9.3). Duration of splash water exposure was positively associated with illness (Cochrane-Armitage trend analysis; statistic [Z]: –3.5; *P* value <0.001). Five case-patients had positive stool tests for *Cryptosporidium* and environmental tests from the splash fountain, filter backwash, and drinking fountain water were positive for *Cryptosporidium*; two case-patients and each environmental isolate were genotyped *C. hominis* laA28R4, predominantly a human pathogen. We observed diapered children sitting on splash park fountains, but identified no source of contamination for the potable fountain water.

**Conclusions:** Human fecal contamination of splash park water and insufficient engineering controls likely caused this outbreak. State governments without splash park regulations might decrease the risk for cryptosporidiosis outbreaks by requiring enhanced disinfection measures (e.g., ultraviolet or ozone treatment), public education to improve splash park users' personal hygiene, and exclusion of persons with diarrhea.

**Keywords:** *Cryptosporidium*, genotype, disease outbreaks, water, sanitation, Idaho

9:15

### Health Symptoms Among Lifeguards at an Indoor Water Park — Ohio, 2007

**Authors:** Bich N. Dang, L. Chen, C. Mueller, K. Dunn, D. Almaguer, C. Otto

**Background:** Hotel indoor water parks are a burgeoning industry with 184 facilities in the US employing hundreds of lifeguards; several thousand patrons visit these parks daily. In January 2007, a local health department requested NIOSH assistance to determine the cause of hundreds of reports of eye and respiratory irritation at a newly opened hotel indoor water park.

**Methods:** Environmental tests included sampling for airborne chloramines (chlorine disinfection by-products) and water testing for a variety of chemical substances and microbes. A symptom questionnaire was administered to workers exposed (70/103 lifeguards) and unexposed (74/99 hotel employees) to the water environment. Prevalence ratios with 95% confidence intervals were calculated between exposed and unexposed groups, and repeated measures analyses compared lifeguard symptoms on days when chloramine concentrations were expected to be high and low, based upon hotel occupancy.

**Results:** Airborne trichloramines were found in the indoor pool area. No water microbes were detected, and water chemistry met Ohio standards. Lifeguards reported more work-related cough (PR 10.2, 95% CI 4.3–24.2), wheezing (PR 9.7, 95% CI 2.4–40.2), shortness of breath (PR 6.7, 95% CI 2.5–18.2), chest tightness (PR 6.7, 2.1–21.4), and eye irritation (PR 9.0, 95% CI 4.1–19.6) than referents in the 4 weeks prior to questionnaire completion. Lifeguards reported more eye irritation (PR 2.0, 95% CI 1.2–3.2) and cough (PR 2.2, 95% CI 1.1–4.5) on days when hotel occupancy was high versus low.

**Conclusions:** With the increasing construction of indoor water parks, more workers and patrons will be at risk for chloramine-associated health problems. Indoor water parks need to monitor and maintain water chemistry and ensure adequate air movement and distribution in the ventilation system to control airborne chloramine concentrations.

**Keywords:** trichloramine, respiratory symptoms, eye and nose irritation, water park

9:35

### Association Between Swimming Pool Operator Certification and Reduced Pool Chemistry Violations — Nebraska, 2005–2006

**Authors:** Bryan F. Buss, T.J. Safranek, J.M. Magri, T.J. Török, M.J. Beach, B.P. Foley

**Background:** State inspection identified extreme chemical abnormalities in a motel swimming pool managed by an uncertified operator after an exposed child was hospitalized with severe laryngotracheobronchitis and 23 other persons experienced illness during December 2006. Certification for motel-pool (Class B) operators is not mandated by Nebraska law and is only required in two counties.

**Methods:** To determine if operator certification is associated with pool chemistry violations, we evaluated 2005–2006 statewide routine pool-inspection reports; start-up, follow-up, and complaint inspections were excluded. We compared free chlorine violations for Class B inspections in counties with and without certified operator requirements. To control for water supply pH, inspections from Class B pools with shared municipal water in two counties (one requiring certification) were compared for pH violations only and concurrent pH and free chlorine violations.

**Results:** Class B free chlorine violations were more likely in counties without (30.9%; 167/541) than with (15.8%; 138/876) certification requirements for Class B operators (prevalence ratio [PR]: 2.0; 95% confidence interval [CI], 1.6–2.4). In Class B pools with shared municipal water, pH violations were more likely in the county without (27.0%; 34/126) than with (18.4%; 107/580) operator certification required (PR: 1.5; 95% CI, 1.05–2.04) and concurrent pH and free chlorine violations were also more likely in the county without (12.7%; 16/126) than with (6.2%; 36/580) more stringent certification requirements (PR: 2.0; 95% CI, 1.2–3.6).

**Conclusions:** Pools not required to have certified operators are more likely to have water-chemistry violations and therefore might pose greater health risks. These results substantiate the need for public pool operator certification requirements to help prevent recreational water illnesses.

**Keywords:** swimming pools, epidemiology, statistical data analysis, chlorine, environmental health, environmental hazards, health hazards

9:55

### Cryptosporidiosis Outbreak Linked to Multiple Recreational Water Venues — Utah, 2007

**Authors:** Renee M. Calanan, R. Rolfs, J. Robertson, L. Bogdano, D. Raccasi, B. Hatch

**Background:** Cryptosporidiosis incidence has increased in the United States, with the majority of outbreaks associated with exposure to treated recreational water venues, including pools and water parks. During the summer of 2007, Utah experienced a cryptosporidiosis outbreak associated with multiple recreational water venues, with person-to-person transmission also implicated.

**Methods:** Cases were identified through reports to local health departments or laboratory reports to the Utah Department of Health. A descriptive study was conducted. Data from confirmed cases, defined as illness among residents having laboratory-confirmed evidence of *Cryptosporidium* infection from June 1–October 6, 2007, were analyzed.

**Results:** A total of 1,853 confirmed cases from all 12 local health districts in Utah were reported. Of these patients, 51% were female, and 34% were aged <5 years. Data indicate that 88% had swum during their reported exposure period, and secondary person-to-person transmission also occurred. Peak rates occurred during the week of August 19 (549.0 cases/100,000 person-years), indicating that initial control efforts (health alerts and voluntary pool hyperchlorination) were inadequate. Additional control measures, including restricting children aged <5 years from pools and mandatory pool sanitation schedules, were imposed on August 28. Incidence decreased to 132.3/100,000 person-years during the week of September 11 and to 19.7/100,000 person-years during the week of September 25, when restrictions were eased.

**Conclusions:** This is one of the largest outbreaks reported in the United States. Recreational water venues were the principal source of transmission, with multiple venues implicated. After enforcement of control measures and seasonal pool closings, the outbreak subsided. Two lessons learned from this outbreak are the need for rapid response before widespread pool contamination and planning for surveillance lag when evaluating interventions.

**Keywords:** cryptosporidiosis, disease outbreaks, public facilities, swimming pools

**Tuesday, April 15, 2008**  
**Concurrent Session E2: Just the Two of Us**  
**— Reproductive Health**  
**Dunwoody Suites 8:30–10:15 a.m.**  
**Moderator: RJ Berry**

**8:35**  
**Reliability of Self-Reported Prepregnancy Weight, Height, and Body Mass Index on Birth Certificates — Florida, 2005**

**Authors:** Sohyun Park, W. Sappenfield, D. Goodman, D. Bensyl, C. Bish

**Background:** Maternal obesity is associated with pregnancy complications and adverse outcomes. Mothers' self-reported weight and height on birth certificates (BC) are widely used for population-based research and surveillance. However, bias has been identified with self-reported measures. We investigated the reliability of self-reported data between two Florida data systems.

**Methods:** Linked BC and Healthy Start Prenatal Screen (HS) data files were used for analyses. Data are collected prenatally (HS) and at delivery (BC). Weight, height, and body mass index (BMI) from BC data were compared with HS. Mean differences were evaluated by using ANOVA. Reliability was measured descriptively and by Cronbach's alpha. Statistically significant findings ( $P < 0.05$ ) are reported.

**Results:** Two-thirds of Florida women receive prenatal screenings. Anthropometric data were available for 104,325 (67%) of 156,587 women. Missing measures were more frequent among women who were older, white, better educated, married, and non-Women, Infants, and Children (WIC) recipients. Absolute agreement between BC and HS was 73% for weight ( $\pm 3$  kg), 87% for height ( $\pm 3$  cm), and 87% for BMI ( $\pm 3$  kg/m<sup>2</sup>). Cronbach's alpha ranged from 0.90 to 0.96 ( $\geq 0.80$  is optimal). Mean differences for weight, height, and BMI by age and maternal characteristics were minimal; Cronbach's alphas were  $> 0.80$ . BC data indicated women with weight  $\geq 75.6$  kg, height  $\geq 168$  cm, and BMI  $\geq 30$  kg/m<sup>2</sup> had higher mean differences for weight (2.33 kg), height (1.03 cm), and BMI (1.08 kg/m<sup>2</sup>) than on HS, respectively.

**Conclusions:** Self-reported BC data were a reliable source of weight, height, and BMI, compared with self-reported HS measures, indicating BC data are useful for surveillance and research purposes. Next steps are to compare these self-report data with actual measurements to assess validity.

**Keywords:** reliability, body weight, body height, body mass index, women, birth certificates

**8:55**  
**Herbal Use Before and During Pregnancy — United States, 1998–2003**

**Authors:** Cheryl S. Broussard, C. Louik, M. Honein, A. Mitchell, National Birth Defects Prevention Study

**Background:** An estimated 38 million U.S. adults use herbal therapies. Despite the emergence of safety concerns about some herbals, demonstration of safety is not required prior to marketing. Because the extent of herbal use among pregnant women is unclear, we estimated the prevalence and patterns of use among women during the periconceptional and prenatal periods.

**Methods:** The National Birth Defects Prevention Study is a case-control investigation of risk factors for major birth defects. Women in 10 states were interviewed by telephone to ascertain herbal exposures (among others) 3 months before and during pregnancy. Herbals include products containing a plant, plant part, or plant extract. Women who delivered infants without major birth defects (control mothers) from 1998–2003 were included. Stata 8 was used for descriptive analyses, including frequencies and cross-tabulations.

**Results:** Of 3,325 control mothers, 299 (9%) reported herbal use immediately before or during pregnancy. Prevalence of use by state varied considerably (3–16%). Women  $> 30$  years of age and women with more than a high school education had a higher prevalence of use, but the prevalence did not vary by race or ethnicity. Among reported products, the most common components were ginger and chamomile (1.4% each), ephedra (1.3%), echinacea and herbal tea (1.0% each), and ginseng (0.8%). Among women who took herbals, use did not appear to change based on pregnancy status.

**Conclusions:** Herbal use among pregnant women was relatively common during the study period, including use of ephedra (which is known to be associated with adverse health effects). Pregnant women and those contemplating pregnancy should discuss potential risks and benefits of herbal use with a health care provider.

**Keywords:** herbal preparation, pregnancy, drug safety, ephedra

9:15

### Smoking Cessation During Pregnancy and Preterm Birth in Seven States — ID, KY, NY, PA, SC, TN, WA, 2004

**Authors:** Laura L. Polakowski, L. Akinbami

**Background:** Preterm birth is a leading cause of infant morbidity and is related to more than one-third of infant deaths. In 2004, more than one-half million (12.5%) of all U.S. births were preterm. Cigarette smoking is among the known risk factors for preterm birth. Newly revised U.S. birth certificates elicit information on smoking status by trimester, providing an additional level of detail not previously collected before 2003. This study examines the association between smoking cessation during pregnancy and preterm birth using the most recent data available from revised birth certificates.

**Methods:** Birth certificate data on 507,819 U.S. resident singleton births in 2004 were analyzed for all seven states that used the revised birth certificate. Smoking status was categorized as 'smoked throughout', 'quit after the first trimester', and 'never smoked' during the pregnancy. Records with intermittent or unknown smoking status were excluded (2.3%). Birth status was categorized as 'term' ( $\geq 37$  weeks) or 'preterm' ( $< 37$  weeks). Logistic regression was used to estimate adjusted odds ratios (AORs) for preterm birth by smoking status, adjusting for maternal age, race/ethnicity, education, marital status, parity, prenatal care, and prior preterm birth.

**Results:** Compared with mothers who reported smoking throughout pregnancy, non-smoking mothers had a 17% decreased odds of preterm birth (AOR = 0.83; 95% Confidence Interval [CI] = 0.81,0.86), and mothers who reported quitting smoking after the first trimester had a 20% decreased odds of preterm birth (AOR = 0.80; 95% CI = 0.75,0.86).

**Conclusions:** As previously observed, smoking throughout pregnancy was associated with greater odds of preterm birth. Mothers who quit smoking during the first trimester of pregnancy had odds of preterm birth similar to that of non-smoking mothers.

**Keywords:** preterm birth, smoking

9:35

### Screening Room: Missed Opportunities for Prevention of Perinatal Group B Streptococcal Disease — United States, 2003–2004

**Authors:** Melissa K. Van Dyke, C. Phares, R. Lynfield, A. Craig, A. Thomas, K. Arnold, J. Mohle-Boetani, K. Gershman, S. Petit, J. Baretta, K. Wymore, S. Zansky, N. Spina, L. Harrison, K. Schutt, E. Zell, S. Schrag

**Background:** Invasive Group B streptococcus (GBS) is a leading infectious cause of neonatal morbidity and mortality in the U.S. In 2002, CDC recommended universal prenatal GBS screening of pregnant women at 35-37 weeks' gestation and intrapartum antibiotic prophylaxis (IAP) for colonized women to prevent vertical transmission. Subsequently, neonatal disease incidence declined but the disparity between black and non-black infants increased.

**Methods:** We evaluated adherence to recommendations using a 2003-04 birth cohort selected from Active Bacterial Core surveillance (ABCs), a 10-state, population-based system that monitors invasive GBS. A sample of births stratified by year, state, and birth hospital was selected using vital records; births in 1998-99 were previously surveyed. Key variables were abstracted from labor and delivery records; prenatal care (PNC) adequacy was assessed using the Kessner index. Weighted data were analyzed using SUDAAN.

**Results:** We abstracted records for 7700 live births; 91% were born at term ( $\geq 37$  weeks), after the recommended screening period. GBS screening increased from 48% of births (95%CI 47-50%) in 1998-99 to 86% (95%CI 85-87%) in 2003-04; more non-black than black births were screened (87% vs. 82%; p-value  $< 0.01$ ). For term-delivery women, inadequate PNC (adjusted OR [AOR]=4.6; 95%CI 3.5-5.9), age  $\geq 40$  years (AOR=1.9; 95%CI 1.1-3.2), previous live birth (AOR=1.8; 95%CI 1.5-2.2) and illegal drug use (AOR=1.7; 95%CI 1.1-2.6) were associated with not being screened; race was not significant. Among term deliveries, 86% (95%CI 84-88%) of GBS positive women received IAP; IAP administration did not differ by race.

**Conclusions:** Adherence to universal GBS screening was high, but screening has not reached important populations, particularly those with inadequate PNC. Screening differences may contribute to but do not fully explain racial disparities in disease incidence.

**Keywords:** Group B streptococcus, pregnancy, screening, evaluation, antibiotic prophylaxis

**9:55**  
**Evaluation of HIV Testing at Labor and Delivery**  
**— Kenya, 2007**

**Authors:** Helen M. Dale, O. Bolu, N. Shaffer, R. Shiraishi, W. Mutsotso, O. Muhenje, P. Mwaura, R. Kamau, D. Mbori-Ngacha, R. Bunnell

**Background:** Anti-retroviral drugs (ARVs) given to HIV-infected mothers in late pregnancy, and their HIV-exposed infants, can reduce mother-to-child-transmission of HIV (MTCT). Many pregnant women in Kenya attending labor and delivery (L&D) do not know their HIV status despite antenatal clinics (ANC) offering HIV testing. We evaluated the feasibility and acceptability of HIV testing at L&D in four hospitals.

**Methods:** During May through November 2007, we reviewed records of women attending L&D to determine the number with unknown HIV status (eligible for testing), reasons for this, and how many eligible women received testing, tested positive and received interventions for prevention of MTCT (PMTCT). We conducted interviews among women offered testing at L&D to assess reasons for acceptance/ refusal.

**Results:** Of 6,266 women attending L&D, 714 (11.4%) did not know their HIV status. Reported reasons for unknown status included non-attendance at ANC (20.5%), attended ANC but not offered testing (45.4%), and offered testing at ANC but refused (19.3%). Of the 714 women, 617 (86.4%) were offered testing at L&D, 570 (92.4%) accepted and 50 (8.8%) tested positive. Six (12.0%) HIV-infected women and 23 (46.0%) newborns received PMTCT ARVs. Sociodemographic factors (age, parity, education) and stage of labor were not associated with test acceptance. Most frequently reported reason for test refusal was fear of result (31.6%). Most frequently reported reasons for test acceptance included desire to know HIV status (81.9%) and awareness of ARVs for PMTCT (44.4%).

**Conclusions:** High acceptance rates suggest that HIV testing at L&D is feasible and acceptable in this resource-limited setting. Resources should be directed to strengthen testing at ANC and L&D, and assure that women who test positive at L&D receive needed interventions.

**Keywords:** HIV, prevention, women, pregnant, transmission

**Tuesday, April 15, 2008**  
**Concurrent Session F1: Every Breath You**  
**Take — Respiratory/Vaccine-Preventable**  
**Diseases**  
**Presentation of the Iain C. Hardy Award**  
**Ravinia Ballroom 10:45 a.m.–12:15 p.m.**  
**Moderators: Chris Van Beneden**

**10:50**  
**Outbreak of *Mycoplasma pneumoniae* at a College**  
**in Maine — 2007**

**Authors:** J. Eric Tongren, J. Winchell, S. Mitchell, M. Deutscher, C. Dao, R. Muhammad, B. Fields, L. Hicks, G. Beckett, K. Gensheimer

**Background:** *Mycoplasma pneumoniae* is a common cause of community-acquired pneumonia, with rare instances of severe neurologic involvement and death. Current diagnostic tests do not provide timely results. We investigated the applicability of a novel real-time polymerase chain reaction (PCR) test and a breath condensate collection method during a *M. pneumoniae* outbreak among students at a college in Maine.

**Methods:** Cases were defined as fever ( $\geq 100.4^{\circ}\text{F}$ ) and cough within the previous 5 days, or pneumonia diagnosed either by clinical examination or by chest radiograph among students attending college during August 21–November 16, 2007. Patients were identified at the college health center and two local hospitals. Oropharyngeal swabs and breath condensate samples were collected and tested by a novel real-time PCR, targeting multiple *M. pneumoniae* specific genes. Secondary culture and serology were also conducted. Samples from 20 healthy students were obtained as controls.

**Results:** Thirty-eight cases were identified (24 cases/1,000 students). Twenty-two (58%) case-patients were male; all case-patients were aged 17–21 years. Twenty-one (55%) case-patients had radiographic findings consistent with pneumonia and three (8%) were hospitalized. Of 19 case-patients who provided specimens, 15 (79%) were real-time PCR-positive for *M. pneumoniae* DNA and three isolates were cultured. None of the breath condensates or oropharyngeal specimens from controls was positive. The outbreak ended in mid-November after implementing recommendations for cough etiquette, hand hygiene, and social distancing.

**Conclusion:** These data indicate that real-time PCR testing for *M. pneumoniae* on oropharyngeal swabs performed well and provided timely results, however, the breath condensate method was not useful in this setting. Real-time PCR from oropharyngeal swabs should be used to help elucidate *M. pneumoniae* etiology during future outbreaks.

**Keywords:** pneumonia, *Mycoplasma pneumoniae*, community-acquired, PCR

11:10

### Community Outbreak of Pertussis — Leake and Neshoba Counties, Mississippi, 2007

**Authors:** Stanley C. Wei, T. Tiwari, A. Baughman, C. Bish, C. Dubray, E. McKinstry, R. James, M. Currier, D. Ware, K. Kennedy, P. Cassidy, K. Tatti, T. Jackson, L. Tondella, T. Clark

**Background:** Pertussis is among the most poorly controlled childhood vaccine-preventable diseases with 15,632 cases reported in 2006. We describe a community pertussis outbreak in Mississippi with a high number of American Indian cases.

**Methods:** Using Mississippi surveillance records, we classified cases occurring in Leake and Neshoba counties from 4/27-10/5/2007 using Council of State and Territorial Epidemiologists pertussis case definitions. We calculated attack rates by age, sex, and race using census 2006 estimates. We obtained vaccination status for a cohort of 2356 persons aged < 11 years from a health center serving 82% of cases. Using life-table analysis to account for vaccine given during the outbreak, we calculated incidence per 100,000 person days of exposure for four vaccine-dose categories: 0, 1-2, 3 (primary series), and 4+ doses ( $\geq 1$  booster).

**Results:** Sixty two pertussis cases (32 probable and 30 confirmed) were reported. Median age of cases was 8.8 years (range 1mo-51yrs); 56% were female. The attack rate (per 1000 population) was 1.2 overall, and was 4.8, 4.0, 2.2, 1.2, and 0.4 among ages 0-4, 5-9, 10-14, 15-19, and 20-64, respectively, ranging from 9.1 among American Indians to 0.2 among whites (RR 41.4; 18.7–91.6). Among health-center children aged <11 years, 74.2% and 80.5% of cases and non-cases, respectively, had recommended number of doses for age at outbreak onset. Disease rates per 100,000 person-days were 22.9, 10.9, 10.4, and 7.5 cases for children with 0, 1-2, 3, and 4+ doses, respectively. Compared to zero doses, vaccine efficacy for 4+ doses was 67.7% (CI: 3.0-86.9).

**Conclusions:** As observed here, despite good vaccine efficacy and coverage, pertussis outbreaks occur. Additional prevention strategies are needed to protect persons at risk.

**Keywords:** *Bordetella pertussis*, disease outbreaks, vaccines, diphtheria-tetanus-pertussis vaccine

11:30

### Outbreak of Measles — Dar es Salaam, Tanzania, 2006: Need for a Two-Dose Measles Vaccine Strategy

**Authors:** James L. Goodson, R.T. Perry, E. Wiesen, O. Mach, M. Kibona, D. Manyanga, M. Kitambi, E. Luman, L.K. Cairns

**Background:** The World Health Organization (WHO) recommends one dose of measles-containing vaccine (MCV), and a second opportunity for MCV for all children; not guaranteeing receipt of two doses. In 2005, first-dose MCV coverage at age 9 months was estimated to be 93% in Tanzania. Supplemental immunization activities (SIAs) provided a second opportunity for children aged 9–59 months in 1999, 7–14 years in 2002, and 9–59 months in 2005. In 2006, Dar es Salaam, Tanzania experienced a large measles outbreak. We conducted a case-control study among children aged 0–18 years to determine risk factors for measles.

**Methods:** Cases were defined as laboratory-confirmed measles or measles symptoms with an epidemiological link to laboratory-confirmed cases, identified from July 1–October 15, 2006. Controls were selected from households identified by a random walk method. Case-patients and controls were interviewed to assess exposure and vaccination status. Independent risk factors were assessed through logistic regression.

**Results:** We interviewed 117 case-patients and 116 controls. Independent risk factors for measles included being unvaccinated (aOR=6.1, 95% CI 2.6–14.3) or receiving only one dose of MCV (aOR=2.5, 95% CI 1.2–5.1) compared to two doses, age <9 months (aOR=13.3, 95% CI 2.9–61.8) or 9–59 months (aOR=4.4, 95% CI 1.1–17.1) compared to 15–18 years; and having a caretaker with primary school education or less (aOR=2.3, 95% CI 1.3–4.4). Vaccine effectiveness was 88% for one dose and 96% for two doses. Overall, 69 (59%) case-patients received <2 doses.

**Conclusions:** The WHO needs to re-evaluate its current policy for measles vaccination, and consider recommending two doses of MCV for all children as part of the routine vaccination schedule.

**Keywords:** measles, outbreak, measles vaccine, risk factor, vaccination

**11:50**  
**Adenovirus 14 Illness Among Basic Military Trainees, 2007**

**Authors:** Jacqueline E. Tate, X. Lu, M. Bunning, L. Lott, C. Panozzo, J. Su, M. Prill, B. Johnson, P. Livingstone, V. Fonseca, D. Erdman, L. Anderson, M-A. Widdowson

**Background:** In 2007, several US states reported clusters of severe respiratory illness, including some deaths, associated with a rare adenovirus [serotype 14 (Ad14)]. To determine the full spectrum of disease and if pre-existing antibodies to other adenoviruses cross-protect against Ad14 disease, we investigated Ad14 illness among basic trainees at a military base.

**Methods:** Clinical data and specimens (throat swab and blood) were collected from trainees in four units graduating after 6.5 weeks of training. Pre-training serum was obtained for this cohort and additionally for trainees hospitalized with Ad14-associated pneumonia. Throat swabs were tested by a real-time Ad14-specific PCR assay. All sera were tested for Ad14 neutralizing antibodies by micro-neutralization assay. Pre-training sera from Ad14-positive trainees with milder illnesses and from hospitalized trainees were also tested for adenovirus 7a (Ad7a) antibodies.

**Results:** Specimens were collected from 171 (79%) of 216 graduating trainees and 85 (50%) of 171 trainees showed evidence of Ad14 infection (pre- to post-training antibody rise or PCR positive swab). During training, 39% of Ad14-positive versus 8% of Ad14-negative trainees reported febrile respiratory illness (risk ratio (RR)=4.8; 95%CI=2.2-10.2) and 35% of Ad14-positive versus 45% of Ad14-negative trainees reported afebrile respiratory illness (cough plus another respiratory symptom) (RR=0.8; 95%CI=0.5-1.1). Only 2% of Ad14-positive trainees reported no symptoms. Ad7a neutralizing antibody was found in 7 (37%) of 19 Ad14-positive trainees with milder illnesses but in none of 16 hospitalized patients ( $p=0.007$ ).

**Conclusions:** This investigation provides the first description of the full spectrum of Ad14 respiratory illness which ranges from sub-clinical infection to severe pneumonia requiring hospitalization. Ad7a antibodies may protect against serious disease suggesting that Ad7 vaccines currently in development may help prevent Ad14 disease.

**Keywords:** adenovirus, respiratory illness, military personnel, vaccine

**Tuesday, April 15, 2008**  
**Concurrent Session F2: In a Big Country — Obesity**  
**Dunwoody Suites 10:45 a.m.–12:15 p.m**  
**Moderator: William “Bill” Dietz**

**10:50**  
**Association Between Awareness of a Community-Based Intervention Program and Walking Among African-American Adults: Findings from the 2005–2006 REACH 2010 Risk Factor Survey**

**Authors:** Isa J. Miles, J. Kruger, Y. Liao, J.E. Fulton

**Background:** Physical activity is protective against several chronic diseases. In 2006, the heart disease mortality rate among African Americans was 30% higher than that among whites, the stroke mortality rate was 41% higher, and diabetes prevalence was nearly twice as high; in 2005, only 40% of African American adults were regularly active. Using 2005–2006 data from the REACH 2010 Risk Factor Survey, we examined whether awareness of REACH 2010 (a community-based program to eliminate racial/ethnic health disparities) was associated with walking among African Americans in communities where a REACH walking intervention was implemented.

**Methods:** We used logistic regression to evaluate the extent to which awareness of the REACH program (yes/no) was associated with any walking ( $\geq 10$  minutes at a time at least once in a usual week) and with walking  $\geq 30$  minutes a day,  $\geq 5$  days per week among all respondents ( $N=4,882$ ). We used linear regression to evaluate the association between awareness of REACH and minutes walked per week among walkers. Models were adjusted for age, sex, education, and community.

**Results:** The prevalence of REACH awareness among respondents was 24.8%. The prevalence of any walking was 77.2% among those who were aware of REACH and 71.3% among those who were not ( $p \leq 0.05$ ). Program awareness had a significant, positive association with any walking (OR=1.36; 95% CI: 1.13–1.63) but not with walking  $\geq 30$  minutes a day,  $\geq 5$  days per week (OR=1.09; 95% CI: 0.90–1.31) or with minutes walked per week ( $\beta=-8.86$ ; 95% CI:  $-81.68$ – $+[63.96]$ ).

**Conclusions:** Awareness of REACH, a possible proxy for exposure to a community-based walking intervention, was associated with any walking but not with amount of walking among African Americans.

**Keywords:** African Americans, walking, health disparities, community-based

11:10

### Knowledge of Physical Activity Guidelines Among United States Adults, HealthStyles 2003–2005

**Authors:** Latetia V. Moore, J.E. Fulton, J. Kruger, J.A. McDivitt

**Background:** Although regular moderate-intensity physical activity (PA) protects against many chronic diseases, people may be unaware of the amount needed for chronic disease prevention. Understanding public knowledge of existing federal PA guidelines may help guide strategies for publicizing new guidelines to be released in fall 2008. To estimate the percentage of U.S. adults who know that current guidelines call for 30 minutes of moderate-intensity PA on  $\geq 5$  days/week, we analyzed data from 2003–2005 HealthStyles, an annual survey of a stratified random sampling of adults aged 18 years or older.

**Methods:** Participants ( $n=13,042$ ) were asked to identify “the minimum amount of moderate-intensity PA the government recommends to get overall health benefits.” Response options included four PA duration (minutes)/frequency (days/week) combinations ( $30/\geq 5$ ,  $20/\geq 3$ ,  $30/7$ ,  $60/7$ ). We estimated percentages of respondents (standardized to the 2000 U.S. population by sex, age, income, race, and household size) who answered correctly and incorrectly and used chi-square tests to calculate  $p$ -values for differences in percentages between dichotomized demographic subgroups.

**Results:** Only 24.1% (standard error [SE] 0.5%) of respondents ( $n=3,141$ ) correctly identified moderate-intensity PA guidelines. Among those responding incorrectly, 82.0% (SE 0.7%) misidentified the guideline as 20 minutes on  $\geq 3$  days/week, the guideline for vigorous-intensity PA. Correct response rates were significantly higher among participants who met moderate and vigorous-intensity PA guidelines and those who were female, married, white, college educated, and  $<55$  years old ( $p<0.001$  for all comparisons).

**Conclusions:** Our finding that most American adults did not know the moderate-intensity PA guideline indicates a need for more effective communication of the guideline and its associated health benefits. Limited knowledge among certain demographic groups also highlights the importance of designing tailored communication strategies.

**Keywords:** physical activity, knowledge, guidelines

11:30

### Associations Between Changes in Vigorous Physical Activity Levels, Obesity Status, and Depressive Symptoms Among Older Women

**Authors:** Dianna Densmore, H. Blanck, M. Serdula, D. Brown

**Background:** Obesity and low physical activity (PA) levels, major public health concerns for an aging U.S. population, are associated with depression. Depressive symptoms affect 18% of U.S. women and are associated with 47%–51% higher medical costs. Little is known about associations of changes in PA levels and obesity status with depressive symptoms among older women.

**Methods:** We assessed female participants’ self-reported data ( $n=3,083$ , age=51–61 years) from two waves (1992, 1998) of the national Health and Retirement Study for associations between vigorous PA and obesity status changes since 1992 and odds for depressive symptoms in 1998. We defined obesity as body mass index  $\geq 30$  kg/m<sup>2</sup>, high vigorous PA as vigorous PA  $\geq 3$  times/week, and depressive symptoms as a Center for Epidemiologic Studies Depression Scale-modified (CES-D) score  $\geq 3$  (range: 0–8). We used logistic regression to determine adjusted odds ratios (AORs) comparing odds for depressive symptoms among women whose vigorous PA levels changed from high to low, remained low, and changed from low to high with women whose levels remained high and AORs comparing odds among women in corresponding obesity categories. Adjustment variables were baseline CES-D score, race, education, income, chronic illnesses, changes in marital status, smoking, and alcohol use.

**Results:** Odds of depressive symptoms were significantly higher among women whose vigorous PA levels changed from high to low (AOR=1.89, 95% confidence interval [CI]=1.17–3.07) than among those whose levels remained high, and among women who either became obese (AOR=1.54, 95% CI=1.06–2.25) or remained obese (AOR=1.46, 95% CI=1.15–1.87) than among those remaining nonobese.

**Conclusions:** These associations should be considered in the development of programs and intervention strategies addressing depressive symptoms among older women.

**Keywords:** depressive symptoms, obesity, physical activity

**11:50**  
**Morbid Obesity and Hospital Discharges — Ohio, 2002–2005**

**Authors:** Michael Cooper, B.J. Mattson, R. Duffy

**Background:** Morbid obesity (MO) (body mass index  $\geq 40$ ) has become a critical public health challenge in the United States, with adult MO rates approaching 5%. Obesity-related diseases (e.g., type 2 diabetes, cardiovascular disease, multiple types of cancer, gallbladder disease, and musculoskeletal disorders) have also increased in prevalence. Health expenditures for persons with MO are estimated to be 81% higher than for nonobese persons. Accurate MO data are lacking in Ohio; to assess the burden of MO there, we analyzed hospital discharge data for 2002–2005.

**Methods:** We analyzed Ohio hospital discharge records with the *International Classification of Diseases* (ICD)-9 code for MO listed as either primary or secondary diagnosis. Variables analyzed included age, sex, year, type of insurance, total costs, weight loss surgeries, and length of hospital stay.

**Results:** During 2002–2005, the number of MO inpatient discharges increased by 42% to 41,033. Women accounted for approximately twice the number of MO discharges as men. Total costs for MO discharges increased 82% during this period, to approximately \$1 billion in 2005. In 2005, Medicare or Medicaid was listed as payer for 54% of MO discharges, a 7% increase compared with 2002. The majority of all discharges were among persons aged 45–64 years, whose 22,072 visits in 2005 represented a 44% increase from 2002. In 2005, weight loss surgeries decreased by 7% to 4,446 procedures. The average length of stay per MO discharge decreased from 5.2 days in 2002 to 4.8 days in 2005.

**Conclusions:** The health-care system will be substantially affected if the number of MO discharges continues to increase. These findings highlight the need for urgent action to combat this growing health threat.

**Keywords:** morbid obesity, obesity, hospital discharge data

**Tuesday, April 15, 2008**  
**Session G: Sweet Child of Mine — Childhood/Adolescence**  
**Ravinia Ballroom 1:45–4:00 p.m.**  
**Moderator: Beth Stevenson**

**1:50**  
**Long-Term Survival Among Infants with Congenital Diaphragmatic Hernia — Metropolitan Atlanta, 1979–2003**

**Authors:** Cynthia F. Hinton, C. Siffel, A. Correa, S. Shapira

**Background:** Congenital diaphragmatic hernia (CDH) is a birth defect in which abdominal organs herniate into the chest cavity, compressing the developing lungs, resulting in severe pulmonary hypoplasia. Infants who survive can have long-term complications, including persistent pulmonary hypertension, recurrent lung infections, and gastrointestinal problems. The prevalence of CDH is 2.4/10,000 live births. The objective of this study was to evaluate selected demographic and clinical characteristics as possible prognostic indicators for long-term survival.

**Methods:** Live births with CDH ( $n=150$ ) for years 1979–2003 were identified using the Metropolitan Atlanta Congenital Defects Program (MACDP). Infants with syndromic or chromosomal defects and those with isolated diaphragmatic paralysis or eventration were excluded. Vital status was documented from the National Death Index and Georgia vital records. Survival probability was estimated using the Kaplan-Meier method; hazard ratios were estimated using a Cox proportional hazards model. Risk was assessed by demographic factors (birth period, race, sex, maternal and paternal age, socioeconomic status) and clinical characteristics (birth weight, gestational age, pediatric hospital admission, multiple defects, mechanical ventilation).

**Results:** Several characteristics were found to be significant positive predictors for long-term survival for infants with CDH: higher socioeconomic status, admission to a pediatric hospital, and belonging to a birth cohort born after the advent of high-frequency ventilator and extracorporeal membrane oxygenation (ECMO) use. Significant negative predictors included the presence of multiple birth defects and low socioeconomic status.

**Conclusion:** Socioeconomic status, hospital admission, and technology use suggest that social patterns of inequality and medical practice affect long-term survival for congenital diaphragmatic hernia. These aspects bear further investigation to facilitate improvement in survival for infants with CDH.

**Keywords:** birth defects, surveillance, diaphragmatic hernia, survival analysis, risk factors

2:10

### Evaluation of Exclusion Policies During a Large Shigellosis Outbreak Associated with Child Care-Aged Children — Mississippi, 2007

**Authors:** Elizabeth Russo, S.Gray, I. See, A. Kasper, S. Hand, M. Currier, M. Lynch

**Background:** Transmission of *Shigella sonnei* among daycare attendees has contributed to community-wide outbreaks in the United States – infecting an estimated 360,000 people annually. Many states require exclusion of children from daycare centers (DCCs) until culture-negative, imparting economic burdens on caregivers without necessarily reducing disease transmission. The Mississippi State Department of Health (MSDH) requires only that children be symptom-free for 24 hours before returning to DCCs. We assessed exclusion policies in Mississippi DCCs during the 2007 outbreak.

**Methods:** A case of shigellosis was defined as culture-confirmed *Shigella sonnei* infection reported to the MSDH between June 1 and November 8, 2007. The incidence of shigellosis in DCC-attendees <5 years old was compared with that among non-DCC-attendees <5 using census data for the most heavily affected county. We surveyed 50 DCC directors statewide regarding diarrhea-related exclusion policies. DCCs with only one reported case were categorized as “low secondary attack rate centers” (LSARCs); DCCs with more than one case were “high secondary attack rate centers” (HSARCs).

**Results:** We identified 583 cases; 232 (40%) occurred among children < 5 years. The relative risk of infection among DCC-attendees was 1.9 (p=0.01). Among 44 DCCs, 24 (55%) followed the symptom-free standard; 17 (39%) required a physician’s note (one of which also required a negative stool culture). The proportion of LSARCs and HSARCs requiring a physician’s note was similar (38% v 40%).

**Conclusions:** DCC attendance was a risk factor for shigellosis in Mississippi, however, requiring a physician’s reassessment prior to return to DCC was not associated with lower transmission rates. This study suggests the need for reexamining state-mandated exclusion and return policies for effectiveness.

**Keywords:** shigellosis, daycare centers, exclusion policies

2:30

### Infant Pertussis and Opportunities for Prevention — King County, Washington, January 1, 2002–November 2, 2007

**Authors:** Matthew P. Hanson, M. Grandjean, L. Vrtis, K. Rietberg, T. Kwan-Gett, J. Duchin

**Background:** Reported pertussis incidence in the United States has increased since 1976 despite continued vaccination efforts. A new tetanus-diphtheria-acellular pertussis (Tdap) vaccine for adolescents and adults might help decrease transmission to infants, who are most severely affected. This intervention opportunity prompted the evaluation of reported infant pertussis cases in King County, Washington.

**Methods:** We analyzed Public Health–Seattle and King County surveillance data from January 1, 2002–November 2, 2007 for infants aged <1 year with pertussis confirmed by CDC case definition criteria. Census data provided infant population size. Infants were considered appropriately vaccinated if dose 1 of pertussis-containing vaccine was received before age 3 months, dose 2 before 5 months, and dose 3 before 7 months. Household members aged 11–64 years were considered Tdap-eligible.

**Results:** Among 179 confirmed infant pertussis patients, median age was 3 months (range: 1–11) and 80% were aged <6 months; 83% were appropriately vaccinated. For 2002–2006, average annual incidence was 167/100,000, with no significant linear trend over time ( $X^2=2.409$ , p=0.121). Compared with an average annual incidence of 79/100,000 for whites, incidence was 288/100,000 among blacks (Rate ratio [RR]=3.7, p=0.017); 227/100,000 among Hispanics (RR=2.9, p=0.046); and 129/100,000 among Asians (RR=1.7, p=0.367). The household was the suspected exposure site for 69% of patients. During January 1, 2006–November 2, 2007, among 39 confirmed cases, the median number of Tdap-eligible household members was 2.5 (range: 1–6).

**Conclusions:** Despite good compliance with recommended vaccination schedules, the burden of infant pertussis in King County, Washington remains high, especially among racial/ethnic minorities. Tdap vaccination of eligible adolescent and adult household members should be used as an additional tool in controlling infant pertussis.

**Keywords:** infant, pertussis, vaccine, Tdap, Washington

2:50

### Effectiveness of Second-Dose Varicella Vaccination Administered During an Outbreak — Philadelphia, Pennsylvania, 2006

**Authors:** Michael Nguyen, D. Perella, C.V. Spain, M. Renwick, E. Chernak, B. Watson, C. Johnson

**Background:** Despite the success of the 1-dose varicella vaccination program in reducing varicella disease and its complications, 15–20% of children were not fully protected, and vaccine effectiveness was insufficient to prevent outbreaks. In response, the Advisory Committee on Immunization Practices recommended postexposure second-dose vaccination to control school outbreaks in 2005, followed by universal 2-dose varicella vaccination in 2006. No published studies describe the effectiveness of second-dose varicella vaccination administered during an outbreak. A school outbreak in Philadelphia involving children aged 3–14 years provided an opportunity to assess the effectiveness of second-dose postexposure vaccination as an outbreak-control measure.

**Methods:** As part of the investigation, a retrospective cohort study was conducted. Parents completed a self-administered questionnaire to assess their children's varicella susceptibility, health history, attendance patterns, and nonschool-related exposures. We calculated the effectiveness of postexposure vaccination by comparing the attack rate among single-dose recipients who had received a second vaccination within 2 months from the start of the outbreak, with the attack rate among single-dose recipients who had not.

**Results:** The questionnaire response rate was 92% (342/370). Before the outbreak, 13% (45/342) of students had had a history of disease, whereas 85% (291/342) had  $\geq 1$  varicella vaccinations. Of 284 students who were single-dose vaccine recipients, 169 (60%) received a second vaccination postexposure, and 37 students were excluded because of unknown second-dose vaccination dates. The attack rate among persons who had received a second dose postexposure was 7% (11/169), compared with 53% (41/78) among single-dose recipients. On preliminary analysis, the effectiveness of second-dose postexposure vaccination was 88% (95% confidence interval 77%–93%).

**Conclusions:** Our results demonstrate that postexposure second-dose vaccination provided additional protection during this outbreak.

**Keywords:** varicella, varicella vaccine, breakthrough varicella, child

3:10

### Severe Symptoms Associated with Coxsackievirus B1 Among Children — Los Angeles County, California, 2007

**Authors:** Kanta D. Sircar, D. Terashita, N. Khetsuriani, L. Mascola

**Background:** Coxsackievirus B1 (CVB1) is a nonpredominant enterovirus serotype, rarely associated with severe disease and death in the past. However, in 2007, approximately 60 hospitalized CVB1-infected patients having severe symptoms were identified in California, Alaska, and Illinois. This study describes patients in Los Angeles County (LAC).

**Methods:** Initial cases were identified by physician notification during June–November 2007, which was followed by active case finding for patients aged  $< 18$  years. Patients with confirmed illness were those with laboratory-confirmed CVB1 infection. Patients with suspected illness were enterovirus-positive and had severe symptoms (e.g., myocarditis, disseminated intravascular coagulation, and meningitis). Medical record abstractions were completed for patients and patients' mothers for children aged  $< 6$  weeks. Information abstracted included symptoms, demographics, and laboratory results. Descriptive statistics were calculated.

**Results:** Preliminary results identified 25 cases: 13 (52%) suspected and 12 (48%) confirmed. Ten patients (40%) were male. Ages ranged from 0 to 14 years old. Eight patients were aged  $\leq 7$  days. These eight patients all had myocarditis and four died; 87% of the mothers were febrile during labor, suggesting vertical route of transmission. Among patients aged  $> 7$  days, infection was most likely community-acquired; among this group, no deaths occurred, and only two (13%) had myocarditis.

**Conclusion:** In 2007, LAC received reported cases of death and myocarditis from CVB1 among infants. Because enteroviral infections are not reportable apart from outbreak settings, continued encouragement of physicians to report severely ill patients is important to better identify and characterize circulating enteroviruses and associated disease burden. Intervention and treatment of enteroviruses is limited, but identification of implicated serotypes can help promote awareness and prevention.

**Keywords:** enterovirus, coxsackievirus B1, vertical transmission, newborn, myocarditis

3:30

**Evaluation of the Foodborne Diseases Active Surveillance Network (FoodNet) Surveillance System for Pediatric Hemolytic Uremic Syndrome — United States, 2000–2005**

**Authors:** Melissa A. Viray, L. Ong, S. Hurd, B. Shiferaw, M. Apostol, L.H. Gould

**Background:** Hemolytic uremic syndrome (HUS) is the leading cause of acute renal failure in children, with a mortality rate of 5%. Most HUS cases are caused by infection with Shiga toxin-producing *Escherichia coli* (STEC). We evaluated FoodNet's active surveillance system for pediatric HUS, which aims to determine the burden of HUS and monitor trends.

**Methods:** FoodNet conducts surveillance at ten sites. Investigators contact providers regularly and review hospital discharge data (HDD) to ascertain cases. Cases were classified using definitions established by FoodNet and the Council of State and Territorial Epidemiologists. The proportion of STEC culture-negative cases tested for serological evidence of STEC infection was determined, and data completeness and timeliness were examined.

**Results:** During 2000–2005, 413 pediatric HUS cases were ascertained, 65 (15.7%) by HDD alone. The longest time lag for HDD review was two years. HUS incidence (per 100,000 children aged  $\leq 18$  years) decreased from 0.98 in 2001 to 0.51 in 2004, but increased to 0.71 in 2005. Cases were classified as confirmed (61.6%), probable (24.9%), or possible (3.9%); 9.6% did not meet criteria. Of the 376 (91%) cases with both STEC culture and serology data, 30% had a negative culture with no serologic testing. Data completion for five key fields (presence of diarrhea, three case-definition laboratory criteria, and culturing for STEC) ranged from 87.6% to 100%.

**Conclusions:** FoodNet's HUS surveillance enables the measurement of changes in incidence. HDD review augments system sensitivity, though at the cost of timeliness. Most ascertained cases met the case definition, although data completeness varied slightly. Serological testing should be improved; this would enhance monitoring of STEC as an etiology of HUS, prompting targeted interventions.

**Keywords:** hemolytic uremic syndrome, surveillance, shiga-toxigenic *escherichia coli*

Tuesday, April 15, 2008

**Concurrent Session H1: Working for a Living — Occupational Health  
Dunwoody Suites 8:45–10:15 a.m.  
Moderator: Christine Branche**

8:35

**Low Hepatitis B Vaccination Coverage Among Healthcare Personnel at Long-Term Care Facilities — Pinellas County, Florida, 2007**

**Authors:** Nicola D. Thompson, V. Barry, K. Alelis, R. Rugletic, L. Miller, J. Perz, S. Bialek

**Background:** Since 1982, hepatitis B vaccination has been recommended for all US Healthcare Personnel (HCP) who have contact with blood, blood contaminated body fluids, or sharps. Vaccination coverage among hospital HCP is estimated to be 75%, but little is known about the level of coverage among HCP at long-term care (LTC) facilities. We evaluated the level of hepatitis B vaccination coverage among HCP in Pinellas County, Florida LTC facilities.

**Methods:** A sample of licensed LTC facilities was selected using a stratified random sampling approach; three strata were created, Nursing Homes (NHs), small Assisted Living Facilities (ALFs) ( $\leq 50$  beds), and large ALFs ( $> 50$  beds). Administrators or Nursing Directors at each facility were asked to provide hepatitis B vaccination coverage rates among their HCP by job title. Results were analyzed and compared by facility type and job title using the chi-square test.

**Results:** Thirty-five of 46 (76%) facilities were compliant with the OSHA requirement to offer hepatitis B vaccination to HCP. Of these, only 49% (17/35) maintained records sufficient to report HCP vaccine coverage. The overall hepatitis B vaccination coverage rate was 30% (288 of 963 HCP), varying by facility type: 32% (52/161) at large ALFs ( $n=7$ ); 30% (235/793) at NHs ( $n=7$ ); and 11% (1/9) at small ALFs ( $n=3$ ) ( $p=0.371$ ). Coverage was higher among Registered Nurses (41%) compared to Licensed Practical Nurses (30%) ( $p=0.049$ ) and nursing assistants (28%) ( $p=0.078$ ).

**Conclusions:** One-quarter of facilities did not have a policy of offering vaccine to HCP, and fewer than half were able to report coverage rates. Among those reporting, coverage rates were low. Efforts are needed to identify barriers to offering and improving vaccine coverage among HCP in LTC settings.

**Keywords:** hepatitis B vaccine, healthcare personnel, assisted living facility, nursing home

**8:55**  
**Effectiveness of Comprehensive Preventive Program To Reduce Beryllium Sensitization at a Beryllium Metal, Oxide, and Alloy Production Plant**

**Authors:** Rachel L. Bailey, C. Thomas, D. Deubner, K. Kreiss, C. Schuler

**Background:** At least 130,000 current U.S. workers are exposed to beryllium (Be) and are at risk for a potentially severe granulomatous lung disease. In a 1999 survey, 11% (77/731) of current workers at a Be-metal, oxide, and alloy production plant were found to have Be-sensitization (BeS) by the Be-lymphocyte proliferation test (BeLPT). The plant initiated increased respiratory and dermal protection and particle migration controls.

**Methods:** In 2000, the plant began testing newly hired workers for BeS with the BeLPT at time of hire and at subsequent intervals. We compared the incidence rate (IR) for workers hired from 2000-2006 to that for workers hired from 1993-1999 who were tested in the 1999 cross-sectional survey. For 2000-2006 workers (n=291), we also calculated an adjusted IR that included those with abnormal BeLPTs at hire, to account for unknown baseline status of the 1993-1999 workers (n=258). We compared the prevalence among 1993-1999 workers with an estimated prevalence for 2000-2006 workers, using the last BeLPT interval result for this latter group as a surrogate for cross-sectional results.

**Results:** Nine 2000-2006 workers became Be-sensitized during 5930 person-months, for an IR of 1.5/1000 person-months. Including 4 with abnormal results at hire, during 5992 person-months, the adjusted IR was 2.2/1000 person-months. Twenty 1993-1999 workers were Be-sensitized during 6012 person-months, for an IR of 3.3/1000 person-months. IR ratio was 2.2 (95%CI, 1.01-5.06); adjusted IR ratio was 1.5 (95%CI, 0.85-2.80). Estimated prevalence for the 2000-2006 workers was 1.7% (5/291) compared to 7.8% (20/258) for the 1993-1999 workers, yielding a prevalence rate ratio of 4.5 (95%CI, 1.72-11.85).

**Conclusion:** Preliminary evidence suggests that the preventive program reduced the incidence of BeS in new workers.

**Keywords:** beryllium disease, occupational respiratory disease, disease prevention, sensitization, surveillance

**9:15**  
**Women's Workplace Discrimination, Race and Psychological Distress: Evidence from the National Longitudinal Surveys**

**Authors:** Fang Gong, S. Baron

**Background:** Workplace stress is estimated to cost \$300 billion annually in healthcare, absenteeism and reduced productivity. Understanding the health effects of job stress is important to help target policies and reduce stress. As more women and minorities enter the workforce, workplace discrimination has become increasingly salient as a job stressor; yet, research is limited on its mental health impacts.

**Methods:** Longitudinal data were analyzed on 6,247 white and 2,347 black women who participated in the National Longitudinal Surveys between 1972 and 1989. Population-averaged logit models were estimated to predict the log odds for the effects of self-reported sexism and racism (whether one experienced workplace discrimination based on sex and race) upon self-reported psychological distress (defined by a single-item question on if "nervousness, tension, anxiety, depression" bothered respondents to be a health problem). Models adjusted for wage, work hours, work tenure, occupations, age, region, education and cohort.

**Results:** Across four survey periods, 23% of the white and 33% of the black women reported feeling distressed at least once; 14% of the white and 9% of the black women reported workplace sex discrimination at least once; 3% of the white and 17% of the black women reported racial discrimination at least once. Multivariate results indicated that for white women, self-reported sex discrimination at work doubled the odds of distress (OR = 2.20, 95% CI=1.83-2.67), whereas for black women, workplace racial discrimination significantly increased the odds of distress (OR = 1.60, 95% CI=1.20-2.12).

**Conclusion:** This study revealed that workplace discrimination significantly but differentially affects self-reported psychological distress for white and black women. It suggests the importance of investigating different types of discrimination in occupational health studies and developing workplace policies targeting discrimination.

**Keywords:** workplace discrimination, psychological distress, racism, sexism, race

9:35

### Industrywide Medical Surveillance of Respiratory Function Among Flavor Manufacturing Workers — California, 2005–2007

**Authors:** Thomas J. Kim, B. Materna, J. Prudhomme, K. Kreiss, N. Sahakian, G. Windham, P. Enright

**Background:** Bronchiolitis obliterans (BO) is a potentially disabling fixed obstructive airways disease that can be caused by exposure to flavorings. In 2004, flavorings-related BO was recognized in a worker in the California flavor manufacturing industry. State-directed medical surveillance of workers in this industry was initiated to identify earlier-stage disease, determine risk factors, and guide prevention strategies.

**Methods:** The California Department of Public Health (CDPH), other governmental agencies, and industry created a collaborative surveillance program. Spirometry and a health questionnaire were administered to workers at risk for inhaling flavoring chemicals; those with abnormal spirometry results were referred for BO evaluation. Among the 29 companies identified, 13 (45%) are included in this preliminary analysis.

**Results:** Among the 318 workers surveyed, the median age was 40 years (range: 18–69 years); 253 (79.6%) were male; 158 (49.7%) Hispanic, 41 (12.9%) non-Hispanic white, and 13 (4.1%) black. Twenty-three workers (7.2%) reported shortness of breath while hurrying on level ground, 15 (4.7%) persistent cough, and 5 (1.6%) wheezing unassociated with a cold. Forty workers (12.6%) had obstructive patterns on spirometry. The odds of an obstructive abnormality among workers who poured, mixed, or measured flavoring ingredients were 2.6 (95% confidence interval [CI], 1.2–5.5) times greater than among other workers. The odds of an obstructive abnormality were 1.1 (95% CI, 0.5–2.8) times greater among those who reported any respiratory symptoms than among those who did not. Two workers received diagnoses of BO.

**Conclusion:** The extent of respiratory symptoms and obstructive abnormalities demonstrates the possibility of early respiratory disease related to flavoring exposure. Companies have responded by reassigning workers, providing respiratory protection, and implementing engineering controls for primary and secondary prevention.

**Keywords:** bronchiolitis obliterans, flavoring agents, diacetyl, spirometry, occupational health

9:55

### Cluster of Organic Dust Toxic Syndrome Cases Among Urban Landscape Workers — Metropolitan Denver, Colorado, July 2007

**Authors:** Tegan K. Boehmer, T. Jones, C. McCammon, T. Ghosh, R. Vogt

**Background:** Organic dust toxic syndrome (ODTS), a noninfectious acute respiratory illness, affects approximately 30%–40% of agricultural workers exposed to organic dust and results in lost productivity. ODTS is rarely described in nonagricultural occupations. On July 10, a physician notified Tri-County Health Department that four City A landscape employees experienced respiratory symptoms after shoveling mulch the previous day. We investigated to determine the source of illness and to provide recommendations to prevent future disease.

**Methods:** A retrospective cohort study was conducted among all City A landscape workers; employees were interviewed about mulch exposure and recent illness. An ODTS case was defined as physician-diagnosed pneumonitis or respiratory symptoms and fever with onset during July 1–12. Medical records were reviewed for employees seeking medical attention. Mulch samples collected on July 11 underwent fungal culture and endotoxin analysis.

**Results:** Five (12%) of 43 landscape workers met the case definition. ODTS risk was greater among six employees who reported high exposure to mulch than among 37 employees who reported low exposure (67% versus 3%; relative risk: 24.7; 95% confidence interval, 3.3–184.9). Among four ill employees with complete blood counts, two exhibited leukocytosis and all had high granulocyte percentages. Mulch samples contained high levels of both *Aspergillus* (>800,000 spores/gram) and endotoxin (>30,000 endotoxin units/gram).

**Conclusions:** This study implicated contaminated mulch as the source of ODTS among urban landscape workers, demonstrating that ODTS is not limited to rural agricultural workers. Safety officers in high-risk urban occupations should be educated regarding the adverse effects of inhaling organic dust. To prevent ODTS among landscape workers, mulch should be stored in dry, well-ventilated areas and handled only by persons wearing respiratory protection.

**Keywords:** organic dust toxic syndrome, pneumonitis, occupational health, fungi, endotoxins

**Tuesday, April 15, 2008**  
**Concurrent Session H2: She Blinded Me with Science**  
**Ravinia Ballroom 8:30–10:15 a.m.**  
**Moderator: Owen Devine**

**8:35**  
**The Changing Epidemiology of *Salmonella* Serotypes — United States, 1996–2006**

**Authors:** Amy L. Boore, M. Iwamoto, M. Hoekstra, R. Bishop, P. I. Fields, D. Swerdlow

**Background:** *Salmonella* bacteria cause an estimated 1,400,000 infections and 18,000 hospitalizations each year in the United States. Control efforts aimed at reducing *Salmonella* contamination of food have focused on the two most common serotypes, Typhimurium and Enteritidis. We conducted a study to determine if these efforts have been effective, and to identify geographic and temporal niches of these and other serotypes that could lead to more targeted prevention initiatives.

**Methods:** We examined data on *Salmonella* isolates serotyped in state health department laboratories and reported to CDC. SAS software was used to describe trends over time and to calculate geographic and seasonal entropy (a measure of dispersion) for the most common serotypes.

**Results:** During 1996–2006, 390,737 *Salmonella* isolates were reported to CDC. The annual incidence decreased from 14.7 isolates/100,000 population in 1996 to 12.1/100,000 in 2002, only to climb back to 13.6/100,000 in 2006. Typhimurium and Enteritidis each experienced a 30% decline, accounting for a third of all isolates in 2006 compared with half in 1996. Other serotypes, however, experienced sharp increases in incidence, such as Newport (51% increase, peak in 2002) and Javiana (69% increase, peak in 2004). These increasing serotypes were also among those that showed the lowest entropy scores, being concentrated in specific months (summer) and states (southeastern).

**Conclusions:** Food-associated regulatory and industry control efforts appear to have been effective in decreasing morbidity from Typhimurium and Enteritidis. However, other *Salmonella* serotypes are increasing in incidence. Entropy analysis, applied to *Salmonella* surveillance data for the first time with this study, will improve understanding of serotype-specific ecologic niches; a critical first step towards focused control efforts that could prevent thousands of serious illnesses each year.

**Keywords:** *Salmonella*, salmonellosis, *Enterobacteriaceae*, enteric bacteria

**8:55**  
**Decrease in Methicillin-Resistant *Staphylococcus aureus* Following an Infection-Control Intervention — Pennsylvania, 1999–2007**

**Authors:** Katherine D. Ellingson, D. Kleinbaum, R. Muder, R. Jain, C. Cunningham, C. Squier, J. Lloyd, V. GebSKI, J. Jernigan

**Background:** Over 90,000 invasive methicillin-resistant *Staphylococcus aureus* (MRSA) infections occurred nationwide in 2005; most were associated with a healthcare exposure. Resource-intensive interventions targeting hospital-acquired MRSA continue to gain support. Quantifying the effect of such interventions is challenging since evaluations are quasi-experimental. We use a modified interrupted time series (ITS) analysis to evaluate the impact of an incrementally implemented MRSA infection control intervention.

**Methods:** A large Pennsylvania hospital implemented an intervention consisting of active surveillance culturing for MRSA, isolation of carriers, hand hygiene, and systems/culture change strategies in three phases. The intervention began in a single hospital wing in 2001, in a surgical intensive care unit (SICU) in 2003, and in the remainder of the hospital in 2005. We identified incident cases from 10/1/1999 to 9/30/2007 as positive, non-surveillance MRSA cultures obtained more than 48 hours after admission from patients with no positive cultures in the previous year. We used Poisson ITS regression to model MRSA incidence density, including predictors for time (in months), intervention, time since intervention, and intervention phase.

**Results:** In the 71 months since initiation of the intervention in 2001, hospital-wide MRSA incidence decreased by 3.1% per month (95%CI=0.9–5.2%,  $p=0.007$ ). When modeling the individual effects of each intervention phase, only the SICU showed a significant decrease in the months following the intervention (3.8% per month, 95%CI=1.7–6.0%,  $p<0.0001$ ).

**Conclusions:** Hospital-wide incidence of MRSA decreased significantly following initiation of a multifaceted prevention program; this decrease, however, is attributable to the strong intervention effect in the SICU. Results suggest that MRSA prevention resources may be most efficiently targeted to high-risk areas. Future evaluation of phased interventions may benefit from ITS analysis.

**Keywords:** infection control, staphylococcal infections, hospitals, intervention studies

9:15

### Lifetime Ovulatory Cycles and Ovarian Cancer Survival — United States, 1980–1997

**Authors:** Cheryl L. Robbins, M. Whiteman, S. Hillis, K. Curtis, P. Marchbanks

**Background:** Ovarian cancer causes more deaths than any other gynecologic cancer. The 2000–2004 incidence and mortality rates per 100,000 U.S. women were 13.5 and 8.9, respectively. Although the number of lifetime ovulatory cycles (LOCs) has been positively associated with ovarian carcinogenesis, the association between number of LOCs and ovarian cancer survival is unknown.

**Methods:** We conducted a longitudinal analysis of 410 women aged 20–54 diagnosed with epithelial ovarian cancer during 1980–1982 from the Cancer and Steroid Hormone Study, a population-based, case-control study. LOC estimates were based on self-reported dates of last menstrual period and menarche, and number of anovulatory cycles caused by breastfeeding, oral contraceptive use, or pregnancy. Vital status (through 1997) was obtained from the Surveillance, Epidemiology, and End Results (SEER) Program. We estimated 15-year survival probabilities using Kaplan-Meier methods and hazard ratios (HRs) for death by LOC quintile using Cox proportional hazards models, controlling for age at diagnosis and cancer stage.

**Results:** During a median follow-up of 110 months, 212 women died. Fifteen-year survival rates were best among women in the lowest LOC quintile (79.8%, 95% confidence interval [CI]=69.0–87.1) and worst among women in the highest quintile (23.5%, 95% CI=14.8–33.4). Women in the highest LOC quintile had three times the risk of death compared with those in the lowest LOC quintile (HR=3.01, 95% CI=1.26–7.22) while risk of death did not differ significantly between other quintiles and the lowest quintile.

**Conclusions:** Number of LOCs was positively associated with risk for death among women with ovarian cancer. Future studies are needed to determine whether this finding should influence treatment decisions.

**Keywords:** ovarian neoplasm, cancer, mortality, survival, ovulation

9:35

### Estimating HIV Prevalence and Risk Behaviors Among Male Clients of Female Sex Workers — Bangkok, Thailand, August–October 2007

**Authors:** Neha S. Shah, W. Subhachaturas, A. Anand, R. Shiraishi, S. Whitehead, S. Tanpradech, C. Manopaiboon, L. Johnston, A. Kim, K. Sabin

**Background:** Through 2007, Thailand had an estimated 580,000 HIV-positive cases and 21,000 AIDS-related deaths. Clients of female sex workers (FSWs) are at high risk for HIV because of risky sexual behaviors and can be a transmission source to the general population. A system to monitor HIV prevalence in this population needs to be developed, however clients are difficult to access.

**Methods:** We piloted a novel variation of respondent-driven sampling (RDS) among FSWs to recruit their clients in Bangkok. RDS, a probability-based sampling method, uses a coupon system for peers to recruit their peers. Initial FSWs, identified through community organizations, recruited peers who referred one of their clients and three other FSWs. After informed consent, clients completed a standardized questionnaire, were HIV tested and asked to return for results. Prevalence and 95% confidence intervals (CI) were weighted based on FSWs' self-reported social network sizes and calculated using RDS Analytic Tool (RDSAT). Logistic regression models incorporated RDSAT-generated weights for the dependent variable and were adjusted for survey design.

**Results:** Among 549 FSW participants, 186 (34%) recruited one client. The median age was 37 years (range: 18–75). HIV prevalence was 21.1% (95% CI 12.2–31.4) and did not vary independently and significantly by demographics, age at first sex, STD symptoms, number of partners and sex with males. Among HIV-positive clients, 26% were married, 69% used condoms with their regular partners and 65% with FSWs.

**Conclusions:** The high HIV prevalence in clients and their inconsistent condom use can promote transmission of HIV infection to the general population. Though prevention programs for FSWs are ongoing in Bangkok, these findings highlight the importance of initiating surveillance and targeted programs for clients of FSWs.

**Keywords:** HIV, sex workers, respondent driven sampling, surveillance

9:55

### Is Influenza Circulation Associated with Incidence of Invasive Pneumococcal Disease?

**Authors:** Nicholas D. Walter, T. Taylor, Jr., W. Thompson, S. Dowell, T. Brammer, D. Shay, M. Moore for the ABCs Team

**Introduction:** Influenza and invasive pneumococcal disease (IPD) are leading vaccine-preventable causes of morbidity and mortality. Both peak in mid-winter. Laboratory and epidemiologic observations suggest IPD can complicate influenza infection. We examined whether circulation of influenza was associated with increased rates of IPD.

**Methods:** We calculated weekly incidence of IPD (isolation of pneumococcus from normally sterile sites) by age strata (<5, 5-64, 65-79, >79 years) within Census Regions among residents of 10 sites with active population-based laboratory surveillance during 1995-2006. For each Census Region, influenza periods were weeks in which  $\geq 10\%$  of specimens submitted to WHO Collaborating Laboratories yielded influenza. We distinguished between seasonal and unexplained (residual) IPD components by fitting sinusoidal curves by least-squares to IPD data during non-influenza periods. We calculated Pearson correlations between influenza positive percentages and unexplained IPD with IPD lagged 0-4 weeks behind influenza. Negative binomial regression models were used to examine the association between influenza periods and IPD incidence (lagged 0-4 weeks), adjusting for seasonality and year and stratifying by Census Region and age strata.

**Results:** We identified 39,834 cases of IPD. IPD rates consistently peaked in early January while influenza peaked between November and March. Percentages of specimens yielding influenza were not markedly correlated with unexplained IPD in any region when examined within age strata and with 0-4 week lags (Pearson correlations = -.30 to .22). Using negative binomial regression models, influenza periods were not significantly associated with increased IPD rates.

**Conclusions:** After accounting for seasonality, this ecological analysis did not identify influenza circulation as a major contributor to IPD incidence during inter-pandemic periods. Further studies of the interactions between influenza and IPD are needed to inform vaccination strategies.

**Keywords:** *Streptococcus pneumoniae*, epidemiology, seasonality, influenza

Wednesday, April 16, 2008

### Concurrent Session 11: Goodness Gracious —Sexually Transmitted Diseases Ravinia Ballroom 10:30 a.m.–12:00 p.m. Moderator: John Douglas

10:35

### Prevalence of Sexually Transmitted Infections Among Female Adolescents in the United States: Data from the National Health and Nutrition Examination Survey, 2003–2004

**Authors:** Sara E. Forhan, S. Gottlieb, M. Sternberg, F. Xu, D. Datta, S. Berman, L. Markowitz

**Background:** In addition to increasing the risk of HIV infection, sexually transmitted infections (STIs) can cause serious sequelae, including pelvic inflammatory disease and cervical cancer. Adolescent females have a high burden of several individual STIs; however, there are few population-based estimates of the overall burden of STIs in this group.

**Method:** Female participants aged 14–19 years in NHANES 2003-2004 underwent testing of (1) urine for *Chlamydia trachomatis* (CT) using BD ProbeTec (n=793); (2) sera for herpes simplex virus type 2 (HSV-2) using an immunodot assay (n=729); (3) self-collected vaginal swabs for *Trichomonas vaginalis* (TV) using PCR (n=695), and human papillomavirus (HPV) using PCR (n=652). We evaluated prevalence of any of 23 oncogenic HPV types or types 6 or 11, responsible for most genital warts (HR/6/11 HPV). We defined “any STI” as CT, HSV-2, TV, or HR/6/11 HPV.

**Result:** Among 838 participants, 404 reported ever having had sex. Weighted prevalence of “any STI” was 25.7% (95% Confidence Interval (CI): 20.1%–32.9%) among all female adolescents and 39.5% (95% CI: 31.1%–50.3%) among those who reported having had sex. The most prevalent STI was HR/6/11 HPV (18.3%), followed by CT (3.9%), TV (2.5%), and HSV-2 (1.9%). The prevalence pattern was similar among those who reported having had sex: HR/6/11 HPV (29.5%), CT (7.1%), TV (3.6%), and HSV-2 (3.4%). Among those with any STI, 15% had  $>1$ . Applying these estimates to 2007 census data, we expect  $>3.2$  million prevalent cases of these STIs among U.S. 14–19 year-old females.

**Conclusion:** STI prevalence is high among U.S. adolescent females. Prevention of STIs and their complications remains an important public health priority for this group.

**Keywords:** sexually transmitted infections, adolescents, prevalence, United States

10:55

### Evaluation of Partner Services for Treatment of *Chlamydia trachomatis* in Family Planning Clinics — California, 2005–2006

**Authors:** Ying-Ying Yu, J. Frasure, G. Bolan, E. Dunne, L. Markowitz, A. Amey, M. Deal, J. Lifshay, L. Packer, H. Bauer

**Background:** With approximately 100,000 cases of chlamydia reported among California women and >10% repeat infection rates in family planning (FP) settings, clinic-based partner management strategies more effective than traditional partner referral are needed. The availability of sexual health services for men in FP clinics as well as legislation allowing patient-delivered partner therapy (PDPT) for chlamydial infections created unique opportunities to improve partner treatment in California. We evaluated use and effectiveness of partner management strategies offered to chlamydia-infected women in FP clinics.

**Methods:** During January 2005–December 2006, women aged 16–35 years with laboratory-confirmed chlamydial infection attending eight FP clinics in California were interviewed by telephone after treatment. Data were collected regarding partner management strategies for as many as three partners. The outcome of interest was patients' reports of partners receiving medication.

**Results:** Overall, 957 male partners were named as contacts by 744 women. Preliminary results indicated that partner management strategies recommended by providers were partner referral (521, 54%), PDPT (193, 20%), bringing partner to treatment visit (131, 14%), provider referral (1, 0.1%), none (93, 10%), and missing (18, 2%). Of partners, 509 (53%) reportedly received medications for chlamydia. By strategy, recommending partners be brought to the clinic for treatment resulted in 81% treatment (i.e., 106/131 partners received medication); PDPT, 79%; partner referral, 44%; and no recommended management, 6%.

**Conclusions:** PDPT was as effective as instructing patients to bring their partners for treatment. PDPT was more effective than traditional partner referral yet less commonly used by FP providers. More research is needed to identify barriers for adopting effective strategies to reach partners who might not return to the clinic for treatment.

**Keywords:** patient-delivered partner therapy, PDPT, chlamydia, sexual health

11:15

### Evaluation of the Impact of Revised Treatment Recommendations on the Use of Fluoroquinolones for Gonorrhea Treatment — United States, 2007

**Authors:** Deborah R. Dowell, T. Peterman, L. Newman, E. Yee, H. Weinstock

**Background:** Gonorrhea, the second most common notifiable disease in the United States, causes infertility and facilitates HIV transmission. Antimicrobial resistance limits treatment effectiveness. Increases in fluoroquinolone resistance prompted CDC to stop recommending fluoroquinolones for gonorrhea treatment in April 2007. This announcement received extensive media attention. Its impact on fluoroquinolone use is unknown.

**Methods:** We compared fluoroquinolone use during February–March 2007 and May–June 2007 using Gonococcal Isolate Surveillance Project (GISP) and Sexually Transmitted Disease (STD) Surveillance Network (SSuN) preliminary data. GISP, established to monitor antimicrobial resistance, also collects treatment information from 27 STD clinics nationwide. SSuN collects enhanced data on gonorrhea patients reported by all providers in 10 counties and one independent city. Analyses were stratified by state and provider type.

**Results:** 1783 GISP patients attended STD clinics in 20 states. In 12 states, including six where previous guidelines recommended discontinuing fluoroquinolones, use was <10% in both time periods. Among the remaining eight states, use continued >70% in three and decreased in five (67.5% before, 3.1% after,  $p<0.001$ ). Among four states in SSuN (1538 patients), fluoroquinolone use remained relatively unchanged in two states (<12% in one and >55% in another). In two states use decreased (55.6% before, 19.8% after,  $p<0.001$ ). In these two states, use decreased more among STD clinic providers (68.2% before, 5.1% after,  $p<0.001$ ) than among family planning and gynecology (82.4% before, 21.4% after,  $p<0.001$ ), primary care (43.5% before, 29.1% after,  $p=0.040$ ), or emergency room, urgent care, and hospital providers (42.5% before, 33.0% after,  $p=0.147$ ).

**Conclusions:** Response to CDC's revised gonorrhea treatment recommendations varied by state. Practices changed most among STD clinic providers. Improved provider education and wider monitoring of antimicrobial use are needed.

**Keywords:** gonorrhea, antimicrobial drug resistance, practice guidelines, therapeutic use, surveillance

11:35

**Inclusion of Azithromycin Resistance Status Increases the Discriminatory Ability of the *Treponema pallidum* Molecular Subtyping System — San Francisco, 2004–2006**

**Authors:** Kenneth A. Katz, A. Pillay, K. Ahrens, K. Hermansteyne, K. Bernstein, J.D. Klausner

**Background:** During 2000–2006, U.S. primary and secondary (P&S) syphilis incidence increased approximately 60%, from 2.1 to 3.3 cases/100,000 population. Molecular subtyping of *Treponema pallidum* (TP) might be useful in controlling syphilis by enabling better understanding of transmission patterns. To evaluate the discriminatory ability of the current TP molecular subtyping system, we used molecular methods to characterize TP specimens in San Francisco (SF) and determine whether TP subtype correlated with azithromycin resistance and patient characteristics.

**Methods:** We used polymerase chain reaction (PCR), restriction fragment length polymorphism, and sequencing methods to subtype TP specimens obtained from P&S syphilis patients examined at SF's sexually transmitted disease clinic during 2004–2006. We used PCR to detect the A2058G mutation conferring azithromycin resistance. We obtained patient data from clinical interviews.

**Results:** Among 43 TP-positive specimens, 37 could be subtyped; 31 were subtype 14d9 and one each was subtype 12e10, 14b9, 14d8, 14d10, 14e10, and 15a12. Of 33 subtyped specimens analyzed, azithromycin resistance was detected in 25/30 14d9 specimens and the 14d10 specimen but neither the 12e10 nor the 15a12 specimen. Diagnosis year, sexual orientation, race/ethnicity, age, human immunodeficiency virus infection status, methamphetamine use, and venues where sex partners had met did not differ significantly among 14d9 and non-14d9 infections or among resistant and sensitive 14d9 infections.

**Conclusions:** Most SF TP infections during 2004–2006 were subtype 14d9, which included azithromycin resistant and susceptible specimens. These findings suggest that TP subtyping methods cannot discriminate between TP strains based on azithromycin resistance status. Including azithromycin resistance status in the TP molecular subtyping system can augment its discriminatory ability and might facilitate targeting of syphilis prevention and control efforts.

**Keywords:** syphilis; *Treponema pallidum*; epidemiology, molecular; sexually transmitted diseases

**Wednesday, April 16, 2008  
Concurrent Session I2: Killing Me Softly — Chronic Illnesses  
Dunwoody Suites 10:30 a.m.–12:00 p.m.  
Moderator: Janet Collins**

10:35

**Analysis of Two New Alcohol Use Questions on the 2007 Georgia Youth Risk Behavior Survey**

**Authors:** Paul C. Melstrom, J. Horan, D. Kanny

**Background:** Excessive alcohol consumption is the third leading preventable cause of death in the United States. Youth who begin drinking early in life subsequently exhibit more alcohol use and misuse, yet examination of underage drinking characteristics in Georgia has been limited. To guide intervention efforts, we analyzed questions added to the 2007 Georgia Youth Risk Behavior Survey (YRBS) addressing type of alcoholic beverage usually consumed and preferred drinking locations.

**Methods:** The Georgia YRBS was administered to 2,465 high school students during spring 2007. In addition to six standard alcohol-consumption questions, students were asked to identify their usual beverage type and location for drinking during the previous 30 days. Using SUDAAN<sup>®</sup>, we calculated prevalence estimates and 95% confidence intervals (CIs) among drinkers and stratified the data by sex, race/ethnicity, grade, and 30-day history of binge drinking.

**Results:** Overall, 38% (95% CI, 36%–40%) of students reported drinking alcohol. Among students who drank, liquor was the most prevalent beverage type (44%; CI, 40%–48%). The most commonly reported location for drinking was at another person's home (58%; CI, 54%–61%). These findings were consistent for both sexes, throughout all grades, and among all racial/ethnic groups. Binge drinkers were even likelier to choose liquor (54%; CI, 49%–59%), and drinking at another person's home (65%; CI, 59%–70%).

**Conclusions:** Georgia high school students who drink are most likely to consume liquor and to drink in someone else's home. Evidence-based strategies (e.g., increasing alcohol excise taxes) can help address underage drinking. In addition, the high prevalence of drinking in others' homes demonstrates a need for increased involvement by parents and guardians to prevent this illegal activity.

**Keywords:** alcohol, youth, location, beverage type

10:55

### Do Modifiable Risk Factors Remain Uncontrolled Among Diabetic Adults with Lower Extremity Disease (LED)?

**Authors:** Rashida R. Dorsey, M. Eberhardt, E.Gregg, L. Geiss

**Background:** Diabetes-related LED is the leading cause of non-traumatic amputations in the US. Five year survival for amputees is 27%, and lifetime health care costs are estimated at \$500,000. Control of modifiable risk factors (MRF) delays the progression of LED to amputation. This study explores the prevalence of MRF among a nationally representative sample of diabetic persons with LED.

**Methods:** Analysis included 948 adults aged  $\geq 40$  years with diabetes, from the National Health and Nutrition Examination Survey, 1999-2004. LED was defined as clinically measured peripheral arterial disease, peripheral neuropathy, or foot lesions. With SUDAAN software, we estimated age-standardized, national estimates of poor MRF control including: hypertension ( $>130/80$  mmHg), unfavorable HDL levels ( $<50$  mg/dL), poor glycemic control (hemoglobin A1c  $>7\%$ ), tobacco use, and being overweight/obese (BMI  $\geq 25$ ). Logistic regression was used to assess the association between LED and MRF.

**Results:** Nearly 33% of diabetic adults had LED and 50% had  $\geq 1$  MRF. Men had higher prevalence of LED than women (43% vs. 26%  $p<.05$ ). Compared to persons without LED, persons with LED had poorer glycemic control (60.7% vs. 46.5%  $p<.05$ ) and lower HDL (70.3% vs. 58.9%,  $p<.05$ ). Among those with LED, women had more hypertension than men (67% vs. 45%  $p<.05$ ) and men had lower HDL levels than women (81% vs. 58%,  $p<.05$ ). After adjusting for age, gender, race, education and health insurance, only the odds of unfavorable HDL levels remained significantly elevated among persons with LED (OR=2.1, 95 % CI 1.1, 4.2).

**Conclusion:** Diabetic adults with LED have higher prevalence of poorly controlled MRFs than those without LED. Prevention of late-stage disease among diabetics with LED should include efforts to target MRFs.

**Keywords:** lower extremity disease, modifiable risk factors, prevention

11:15

### The Impact of a New Sex-Specific Definition of Binge Drinking on Prevalence Estimates for Women — United States, 2001–2006

**Authors:** Pollyanna R. Chavez, D.E. Nelson, R.B. Brewer, T.S. Naimi, D. Jarman

**Background:** Binge drinking is a widespread risk behavior that accounts for more than half of the 75,000 alcohol-attributable deaths each year in the United States. In response to evidence that women are at increased risk for alcohol-related harm after consuming  $\geq 4$  drinks per occasion, in 2006 the Behavioral Risk Factor Surveillance System (BRFSS) lowered the threshold used to define binge drinking among women from 5 drinks to 4. To assess the impact of this change, we calculated the increase in binge drinking prevalence among U.S. women, and differences in this increase by age, race, income, education, and state.

**Methods:** Using 2001–2006 data from the BRFSS, which collects data from state-based telephone surveys, we assessed and compared state and national trends in binge drinking among women aged  $\geq 18$  years. We also stratified national binge drinking prevalence estimates for 2005 and 2006 by age, income, race, and education.

**Results:** Nationally, the prevalence of binge drinking among women remained relatively stable from 2001 (7.3%, 95% confidence interval [CI] =7.0–7.6) to 2005 (7.1%, 95%CI =6.9–7.3) but increased to 9.9% (95%CI =9.7–10.3; 40.2% relative increase) in 2006. The largest increases between 2005 and 2006 were among women aged 21–34 years, Asian-American women, and women with higher income and education. By state, the absolute increase in binge drinking prevalence among women ranged from 0.5 percentage points in Tennessee to 5 percentage points in California.

**Conclusions:** With this new gender-specific definition, the BRFSS detected a higher prevalence of female binge drinking in 2006 than in 2005 and was better able to characterize women at risk for alcohol-related harm. Evidence-based strategies to prevent binge drinking should be widely adopted.

**Keywords:** alcohol, binge drinking, gender-specific, prevalence, women

11:35

**Frequent Mental Distress and Chronic Conditions  
— 2004 Jordan BRFSS**

**Authors:** Italia V. Rolle, M. Zindah, A. Belbeisi, H. Walke, T. Strine, P. Nsubuga, G. Perry, E. Maes, B. Jarrar, A. Mokdad.

**Background:** In the United States, there are numerous studies examining mental health and chronic diseases. However, in developing countries such as Jordan, information on mental health status is limited due to societal stigma; and less attention has been paid to chronic diseases because of the continuing impact of infectious diseases on the population. Our objective was to determine the prevalence of frequent mental distress (FMD), a proxy for mental illness, and the association between FMD, chronic conditions, and health behaviors in Jordan.

**Methods:** The second cycle of the Jordan Behavioral Risk Factor Survey conducted in 2004 served as the data source. The sample consisted of 3,273 Jordanian adults age 18 years and older. Logistic regression was used to obtain odds ratios adjusted for age, gender, marital status, education and income.

**Results:** Among Jordanian adults, the prevalence of FMD was 6%. In the adjusted models, persons with the following conditions and health behavior were more likely to have FMD when compared to persons without those conditions or behavior: hypertension (Adjusted Odds Ratio [AOR] = 1.68, 95% Confidence interval [CI] = 1.09-2.60); high cholesterol (AOR = 1.95, 95% CI=1.14-3.34); asthma (AOR = 1.95, 95% CI = 1.09-3.48); and current smoker (AOR = 2.19, 95% CI = [1.50-3.20]). The relationship between vigorous physical activity and FMD was not significant.

**Conclusions:** In Jordan, the prevalence estimate of 6% indicates the extent of FMD among adults and establishes a much needed baseline for mental illness. As a result of the associations observed between FMD and chronic conditions (hypertension, high cholesterol, asthma) and smoking, we recommend targeting persons with these conditions and behavior for mental health evaluation during primary care visits.

**Keywords:** chronic disease, Jordan, mental health, BRFSS

**Monday – Friday Poster Session  
Meet the Authors**

**Ravinia Ballroom 12:30–1:30 p.m.**

**Posters 1–16: Cheeseburgers in Paradise  
Posters 17–30: Things That Make You  
Go Hmmm . . . .**

**Poster 17**

**The Association Between Sexual Violence and HIV  
— Swaziland, 2007**

**Authors:** Sapna Bamrah, A. Reza, M. Breiding, J. Gulaid, Z. Mthethwa, J. Mercy, C. Blanton, L. Dahlberg, M. Anderson, S Settergren.

**Background:** Sexual violence can negatively affect physical and psycho-social health. Previous studies have suggested that sexual violence victims are at increased risk of HIV infection from direct transmission, increased vulnerability, and sexual risk-taking. As part of a larger study in Swaziland, where adult HIV prevalence is 26%, we described the burden of sexual violence and explored associations with HIV status in young women.

**Methods:** We conducted a national household survey of 13-24 year-old females using a two-stage cluster sample survey design. Survey questions were administered by female interviewers and focused on knowledge, experiences, and outcomes of sexual violence and HIV/AIDS.

**Results:** Of the 1900 households visited, 1300(68%) had an eligible female; 1244(96%) females completed the questionnaire. Among respondents, 603(48%) reported having experienced sexual violence in their lifetimes. A higher percentage of those who reported having had an HIV test said they had experienced sexual violence compared to those who reported no HIV test, (OR= 2.9, p<0.001). Of the 351 females who reported receiving results of an HIV test, 44(12.5%) stated they were HIV-infected. Of the reported HIV-positive respondents, 47% self-reported forced or coerced intercourse compared to 21% of the HIV-negative and non-tested females (p=0.02). Individuals who reported the death of at least one parent were more likely to be victims of sexual violence (OR=1.3, p=0.01), and to have reported HIV-infection (OR=2.8, p=0.02).

**Conclusions:** For young women in Swaziland, having had HIV testing is correlated with self-report of having experienced sexual violence and having HIV infection; HIV infection is correlated with having experienced sexual violence. This highlights the importance of addressing both sexual violence and HIV/AIDS, and targeting high-risk populations within prevention and response programs.

**Keywords:** sexual violence, gender-based violence, HIV testing, child abuse

## Poster 18

### Late HIV Diagnosis Among Injection-Drug Users in 33 U.S. States, 2001–2004

**Authors:** Anna Y. Grigoryan, T. Durant, I. Hall, L. Espinoza, X. Wei

**Background:** The timeliness of HIV diagnosis and the initiation of antiretroviral treatment are major determinants of survival for HIV-infected people. In 2004, 46% of HIV-infected injection drug users (IDUs) in the United States had a late HIV diagnosis. We determined the factors associated with late HIV diagnosis and survival after HIV diagnosis among IDUs.

**Methods:** We analyzed HIV/AIDS surveillance data for 2001–2004 from 33 states with confidential name-based HIV reporting. We examined late HIV diagnosis (AIDS diagnosis <12 months after the HIV diagnosis) by selected demographics of IDUs aged  $\geq 13$  years. Logistic regression analysis was stratified by race/ethnicity. We used standardized Kaplan-Meier survival methods to compare the survival of IDUs and persons infected through male-to-male sexual contact or high-risk heterosexual contact.

**Results:** During 2001–2004, 42% (10,500) of the estimated 24,827 IDUs had a late HIV diagnosis, a larger proportion than that for all other risk groups combined (37%). Among IDUs, late diagnoses increased with age. The percentage of late diagnoses was higher for men (46%, crude odds ratio [cOR]=1.6,  $p < .001$ ) than women (36%), and higher for blacks (43%, cOR=1.1,  $p < .001$ ) than whites (41%) or Hispanics (41%). The adjusted odds of late HIV diagnosis were higher for men than women and increased with age for all racial/ethnic groups. Three-year survival after HIV diagnosis was lower for male IDUs (87.6%, 95% confidence interval [CI]=87.5–87.7) compared with men infected through male-to-male sexual contact (92.0%, 95% CI=91.9–92.1) or high-risk heterosexual contact (92.3%, 95% CI=92.3–92.4).

**Conclusions:** A substantial proportion of HIV-infected IDUs received their HIV diagnosis late. Prevention efforts must ensure early HIV testing, access to care, and antiretroviral treatment for IDUs.

**Keywords:** HIV, AIDS, United States, logistic models, odds ratio, risk factors, survival analysis, Kaplan-Meier estimate

## Poster 19

### Number of Named Partners Identified by Persons with Acute Versus Established HIV Infection — North Carolina, 2002–2007

**Authors:** Zackary S. Moore, S. McCoy, J. Kuruc, M. Hilton, P. Leone

**Background:** Acute human immunodeficiency virus (HIV) infection (AHI) is associated with high infectivity. Since November 2002, North Carolina has routinely detected AHI by nucleic acid amplification testing (NAAT) of specimens negative by antibody testing. To better understand the importance of AHI detection, we compared the number of named partners identified by persons with AHI with the number identified by persons with established HIV infections (EHI).

**Methods:** We evaluated data from state surveillance databases for all persons aged  $\geq 18$  years with HIV diagnosed during November 1, 2002–August 23, 2007. We defined AHI as a positive NAAT and a negative antibody test from the same date. We compared the odds of naming two or more partners during the period of interest (3 months before interview for AHI and 12 months before for EHI) by using a logistic regression model controlling for age, race, drug use, and men who have sex with men (MSM).

**Results:** During the study period, AHI was diagnosed in 97 persons and EHI in 8,783. Those with AHI were younger (median age 29 versus 39 years;  $P < 0.01$ ) and more commonly MSM (57% versus 34%;  $P < 0.01$ ). We identified an interaction between sex/MSM and AHI in our model. AHI was strongly associated with identifying two or more partners among MSM (odds ratio [OR]: 8.36; 95% confidence interval [CI], 3.27–21.34), but this association was not significant among women (OR: 2.63; 95% CI, 0.94–7.36) or heterosexual men (OR: 1.72; 95% CI, 0.71–4.20).

**Conclusions:** In North Carolina, persons with AHI identified more named partners than persons with EHI, particularly among MSM. Detecting AHI offers important opportunities to prevent HIV through partner counseling and referral services.

**Keywords:** HIV, disease transmission, disease notification, contact tracing

## Poster 20

### Register's Annual Great Bicycle Ride Across Iowa: Can Hand-Cleansing Be Improved?

**Authors:** Deborah L. Dufficy, A. Fleming, S. Dobie, P. Quinlisk, K. Soyemi

**Background:** Approximately 17,000 cyclists rode in the Register's Annual Great Bicycle Ride Across Iowa (RAGBRAI), July 22–28, 2007. Bicycle tours in 2000–2006 through Georgia, Maryland, and Kansas had outbreaks attributable to inadequate hand hygiene that affected 18%, 16%, and 26%, of interviewees, respectively. To evaluate hand hygiene as prevention for fecal-oral-associated outbreaks, we assessed number, usefulness, location, and frequency of use of hand-cleansing stations.

**Methods:** To ascertain suitability and usage of hand-cleansing stations, we (1) interviewed a convenience sampling of cyclists queuing or resting in RAGBRAI towns and (2) observed hand-cleansing by cyclists exiting portable restrooms in three towns on 3 days.

**Results:** The mean age of the 371 interviewees was 43 years (range: 9–70). Fifty-three percent (166/314) of cyclists had not seen hand-cleansing stations in two thirds of towns. Inadequate supplies at hand-cleansing stations were encountered by 20% (75/371) of cyclists. The majority (82%; 292/357) reported always or usually cleaning hands after portable restroom use. Cyclists recommended adding hand-cleansing stations (83%; 232/280), better visibility/signage (20%; 55/280), and adequate stocking (16%; 44/280). We observed 39% (189/490) of all cyclists cleaning their hands after exiting portable restrooms, but 88% (184/210) cleaned hands when hand-cleansing stations were conveniently located in front of and within 25 feet of restrooms. Hand-cleansing was associated with conveniently located stations (odds ratio: 96; 95% confidence interval, 35.2–260.3).

**Conclusions:** Although hand-cleansing stations were intermittent, RAGBRAI cyclists reported and were observed cleaning hands after using portable restrooms when hand-cleansing stations were conveniently located. Participants in such events will clean their hands, thus reducing the risk for disease, if hand-cleansing stations are ample, convenient, and well-stocked.

**Keywords:** handwashing, hygiene, bicycling

## Poster 21

### Cluster of Methicillin-Resistant *Staphylococcus aureus* in a Burn Unit — New York State, 2007

**Authors:** Jenifer L. Jaeger, C. Keehufus, A. Burns, E. Villamil, G. Lukacik, J. LoCurto-Bonfe, D. Kiska, S. Riddell, G. Johnson, B.J. Wallace, P.F. Smith, J. Magri

**Background:** Methicillin-resistant *Staphylococcus aureus* (MRSA) is a frequent cause of health-care-associated (HA) infections. Burn unit (BU) patients are particularly vulnerable as MRSA infections are associated with increased morbidity and mortality. In August 2007, the New York State Department of Health learned of an HA-MRSA cluster of seven BU patients spanning the previous 5 months. Initial cluster investigation revealed all patients had undergone surgery, and five MRSA isolates matched by pulsed-field gel electrophoresis. We conducted a retrospective cohort study to identify HA-MRSA risk factors and potential infection-control (IC) breaches.

**Methods:** The cohort consisted of 1,372 patients admitted to five (including the BU) intensive care units (ICUs) during March 1–September 30, 2007, with negative MRSA screens  $\leq 48$  hours after admission, obtained as part of this hospital's MRSA control program. Cases had a positive MRSA culture  $>48$  hours after admission.

**Results:** The cohort study identified 18 MRSA-positive case-patients (including the seven cluster patients): four bloodstream infections and 14 non-sterile site isolates. On preliminary analysis, HA-MRSA risk was higher for BU (7/128 [5.5%]) versus other ICU patients (11/1,244 [0.9%]), relative risk [RR]: 6.2; 95% confidence interval [CI], 2.4–15.7). Among patients exposed to any burn surgeon, HA-MRSA risk was associated with Surgeon A (6/10) versus other burn surgeons (1/27; RR: 16.2; 95% CI, 2.21–18.4). All environmental and health-care-worker cultures were MRSA-negative. Although no specific source or IC breach was confirmed, the outbreak ended after hospital IC staff reinforced IC practices and policies with BU personnel, including contact precautions for MRSA-positive patients and environmental cleaning.

**Conclusions:** Intensified IC efforts are effective in interrupting MRSA transmission in high-risk acute-care settings such as burn units.

**Keywords:** methicillin-resistant *Staphylococcus aureus*, health-care-associated infections

## Poster 22

### Using Active Microbiologic Surveillance During an Outbreak of Healthcare-Associated Extended Spectrum Beta-Lactamase-Producing *Klebsiella pneumoniae* Infections — New Jersey, 2007

**Authors:** Adam J. Langer, P. Lafaro, C. Genese, P. McDonough, R. Nahass, C. Robertson

**Background:** Extended spectrum beta-lactamase-producing (ESBL) bacteremia-associated mortality is reportedly 61% versus 24% for non-ESBL infections; 50% of intensive care unit (ICU) *Klebsiella pneumoniae* isolates are reportedly ESBL. On June 11, 2007, a hospital reported that five ICU patients had been infected with ESBL *K. pneumoniae* since April, in contrast with three expected cases. We investigated to characterize the outbreak and implement control measures.

**Methods:** On June 11, we reviewed patients' charts to confirm diagnoses and identify exposures. We also instituted enhanced infection control (EIC), including contact precautions, infected patient cohorting, weekly complete patient-room cleaning, and weekly collection of surveillance cultures from all ICU patients. We performed cultures from staff common to all infected patients. All isolates underwent pulsed-field gel electrophoresis (PFGE).

**Results:** We initially reviewed five charts. One isolate was not ESBL; we excluded this patient. Common ICU exposures included endotracheal/tracheostomy tube placement, but no common intubation personnel were identified. Surveillance and clinical cultures identified three colonized patients and two infected patients, respectively, for an infection rate of ~8.6 cases/1,000 patient-days. Seven of nine isolates were indistinguishable by PFGE. Five staff had contact with all patients; none were colonized. We continued surveillance cultures until August 17, but identified no additional cases. The earliest infected patient was identified on April 26; two other infected patients were in ICU concurrently. The ICU admitted one infected patient after EIC implementation, the only failure.

**Conclusions:** These findings implicate transmission among patients as the likely cause of the outbreak. Because no direct patient-to-patient contact occurred and EIC was effective (with one exception), transmission likely occurred through health-care workers' hands. This investigation highlights EIC's effectiveness for infections transmitted among patients.

**Keywords:** beta-lactamases; *Klebsiella pneumoniae*; infection control; cross infection; patient isolation; electrophoresis, gel, pulsed-field

## Poster 23

### A Fungus Among Us: Outbreak of Zygomycosis Among Hematology Patients — Georgia, 2007

**Authors:** Eloisa Llata, D. Blossom, J. Possehn, C. Rao, K. Wannemuehler, J. Noble-Wang, H. Khoury, A. Langston, B. Hackman, B. Ribner, G. Lyon, K. Arnold, M. Brandt, T. Chiller, A. Srinivasan, S. Magill

**Background:** Zygomycosis is a recently emerging invasive mold infection, particularly among immunosuppressed persons, that is resistant to many antifungals and has a >60% mortality. In September 2007 we investigated an outbreak of zygomycosis among hematology patients at a Georgia hospital.

**Methods:** We reviewed microbiology and pathology databases to identify cases, defined as hematology service patients with laboratory-confirmed zygomycosis during January 1, 2006-October 31, 2007. Cases were matched to randomly selected controls based on underlying hematologic disease and hospital discharge date. Clinical data, including antifungal use, were collected on cases and compared to controls by using conditional logistic regression. We performed an environmental assessment of the ventilation system and the inpatient hematology wards. Clinical and environmental zygomycete isolates were identified and compared by DNA sequencing.

**Results:** Of 11 cases identified, 5 (45%) were likely hospital-acquired and 5 (45%) died during their hospitalizations. On univariate analyses, cases were more likely than controls to have refractory underlying disease (Odds Ratio [OR]=13.7, 95% Confidence Interval [CI]=1.31-689), received voriconazole antifungal prophylaxis (OR=11.3, 95% CI=1.11-infinity), received the antifungal micafungin (OR=6.8, 95% CI=1.16-71.6), or have neutropenia >14 days (OR=11.5, 95% CI=1.27-558). A hospital environmental culture grew the same zygomycete species that was isolated from one case patient. Air handling problems were detected in inpatient rooms.

**Conclusions:** This is the largest zygomycosis outbreak ever reported. Underlying disease state and type of antifungal prophylaxis can help identify patients at risk for zygomycosis, and environmental factors should be considered to prevent future outbreaks.

**Keywords:** zygomycosis, hematologic neoplasms, hospital infections, nosocomial infections

## Poster 24

### Outbreak of Polymicrobial Bloodstream Infections Among Pediatric Hematology-Oncology Patients — United States, 2007

**Authors:** Sarah F. Schillie, P. Wiersma, C. Shivers, A. Shams, J. Noble-Wang, S. Banerjee, K. Arnold, C. Drenzek, H. Keyserling, R. Watson, L. Gonzalez-Ryan, L. Kendrick, A. Srinivasan

**Background:** Central venous catheters (CVCs) are frequently used in pediatric hematology-oncology patients. They are associated with serious complications, including approximately 250,000 bloodstream infections (BSIs) annually. On September 10, 2007, a new pediatric hematology-oncology clinic opened. By September 23, six of 30 patients from the new clinic developed BSIs. The clinic voluntarily closed on September 23 and an investigation was conducted to identify the cause of infections.

**Methods:** Case-patients were seen in the new clinic and developed a positive blood culture within 10 days. Staff and parent interviews were conducted and CVC accessing procedures were observed. Environmental samples were collected. Multivariable analyses were performed by exact conditional logistic regression.

**Results:** Thirteen case-patients were identified, yielding an attack rate of 43%. Seventeen bacterial and fungal organisms were recovered from patients' blood cultures. No more than three patients were infected with the same organism. All case-patients had saline flushes to clear their CVC. Staff anticipated difficulty obtaining flush from the dispensing system post move. Therefore, saline was inappropriately drawn the day before use, and multiple doses were obtained from single-dose preservative-free vials. On multivariable analysis, having a CVC flushed with predrawn saline (aOR=15.6; 95% CI=1.7–infinity) and being post immunosuppressive treatment (aOR=23.8; 95% CI=1.8–infinity) were significantly associated with BSI. Although no environmental source was identified, interviews revealed inappropriate cleaning practices, especially in the medication preparation area.

**Conclusion:** The lack of a clear etiology and polymicrobial nature suggests a complex multifactorial cause. The association between BSI and receiving saline flushes predrawn from single-dose preservative-free vials points to potential contamination during syringe filling and issues with medication preparation area cleanliness. Use of prefilled unit-dose syringes could help prevent similar occurrences.

**Keywords:** hospital outbreak, bloodstream infection, central venous catheter, pediatrics, hematology, oncology

## Poster 25

### Missed Opportunity? Identification of Sexually Transmitted Infections by HIV-Care Providers in Mozambique — 2006 – 2007

**Authors:** Nandini Selvam, J. Langa, D. Lee, I. Benech, L. Newman

**Background:** HIV and Sexually Transmitted Infection (STI) co-infection increases risk of HIV transmission. In developing countries like Mozambique, STIs are managed syndromically (treated based on syndromes like genital discharge, ulcers, and condyloma), and through syphilis screening tests. Previous studies show a high prevalence of STIs in Mozambique. This evaluation aimed to assess if syndromic management training increased syphilis screening and identification of STI syndromes by HIV-care providers.

**Methods:** Pre-training, charts of new patients at two HIV clinics over a 1-year period were randomly selected for abstraction. Post a 5-day syndromic management training, data were abstracted for all new patients presenting over a 1-month period.

**Results:** Pre-training evaluation included 521 patients (68% female). Syphilis results were missing for 266(51%) patients; of those with results, 22/255(8.6%) were positive. Among females, 47/341(13.8%) reported ever having discharge, 15/338 (4.4%) ulcers, and 6/339(1.8%) condyloma. Among males, 11/165 (6.7%) reported ever having discharge, 9/165 (5.5%) ulcers, and no condyloma. Pre-training, 54/343 (15.7%) females and 14/165 (8.5%) males reported ever having an STI syndrome. Post-training evaluation included 308 patients (64.3% female). Syphilis results were missing for 175 (57%) patients; of those with results, 30/133 (22.6%) were positive. Among females, 47/187(25.1%) reported ever having discharge, 8/187(4.3%) ulcers, and 2/187(1.1%) condyloma. Among males, 6/95(6.3%) reported ever having discharge, 6/97(6.2%) ulcers, and 1/97(1.0%) condyloma. Post-training, 51/187(27.3%) females and 12/97(12.4%) males reported ever having an STI syndrome.

**Conclusions:** Despite an intensive training on STI management for HIV-care providers at these two clinics, syphilis screening did not increase. Nevertheless, detection of STIs on the basis of clinical syndromes did improve, particularly among HIV-infected females. Additional work to understand and address barriers to improved STI screening is warranted.

**Keywords:** STD, STI, HIV, Mozambique

## Poster 26

### West Nile Neuroinvasive Disease in Wyoming and Surrounding States — 2007

**Authors:** Stacey A. Anderson, N. Lindsey, D. O'Leary, T. Murphy

**Background:** West Nile Virus (WNV) is a mosquito-borne virus that causes illness ranging from fever to neuroinvasive disease (WNND). Since 1999, 27,334 cases and 1,060 fatalities have been reported in the US. In 2003, the Great Plains region experienced a WNV epidemic with six states (CO, NE, ND, SD, TX, and WY) reporting 77% of national cases. Since 2003, Northern Plains and Rocky Mountain states have reported counties with high WNND incidence ( $\geq 10$  cases/100,000 population). To compare WNND incidence in Wyoming with surrounding states, we examined state- and county-level WNND rates.

**Methods:** WNND is defined as laboratory-diagnosed WNV infection with encephalitis, meningitis, or acute flaccid paralysis. Using 2007 ArboNET surveillance data, we calculated and ranked WNND rates per 100,000 population from CO, ID, MT, NE, ND, SD, UT, and WY, using 2000 US Census Bureau statistics.

**Results:** State-specific WNND incidence ranged from 0.5 (ID) to 7.6 (ND), with Wyoming (3.0) falling below the mean (3.3). Among 121 counties reporting WNND cases, incidence ranged from 0.3 to 83.4 (mean: 14.0). Wyoming's highest incidence counties were Hot Springs (41.0; sixth), Goshen (31.9; 12<sup>th</sup>), and Fremont (14.0; 45<sup>th</sup>). The 25 highest incidence counties were distributed as follows: ND (7), SD (7), MT (5), CO (2), NE (2), and WY (2). Of these, certain states reported low case (72%  $\leq 2$  cases) and population numbers (84%  $\leq 10,000$  and 36%  $\leq 5,000$ ).

**Conclusions:** In 2007, Wyoming had average state-level WNND incidence and fewer high-incidence counties, compared with neighboring states. The majority of highest incidence counties had limited numbers of WNND cases. Among these low-population counties, incremental changes in case numbers result in substantial incidence fluctuations, potentially creating challenges for targeting public health resources.

**Keywords:** West Nile virus, West Nile neuroinvasive disease, West Nile encephalitis, West Nile meningitis, Wyoming

## Poster 27

### Evaluation of Birth Certificate Accuracy — Kentucky, 2006

**Authors:** Suzanne F. Beavers, T. Jewell, D. Thoroughman, S. Robeson

**Background:** Although birth certificate data are crucial to public health planning, they are often recorded by technicians without medical training. In 2004, Kentucky was one of nine states that converted from the 1989 birth certificate to the 2003 Standard Certificate of Live Birth to improve knowledge of maternal and child health (MCH) indicators. We evaluated current birth certificate accuracy to determine their usefulness for public health surveillance.

**Methods:** We selected two community hospitals (CH) and two tertiary-care hospitals (TCH) and generated a random sample of 60 infants born at each facility. We compared four key MCH indicators on the birth certificate with available maternal and infant hospital records. Overall Kappa statistics for agreement were computed for maternal diabetes, maternal hypertension, and neonatal intensive-care unit (NICU) admission to account for random agreement and indicator prevalence. Differences in obstetric estimate of gestational age (EGA) were also computed.

**Results:** Of the 240 births selected, 186 records were available. Agreement between the hospital and birth certificate was high for NICU admission (CH, 98%; TCH, 97%, Kappa=0.84, 95% Confidence Interval [CI]=0.71–0.98). Agreement for maternal diabetes prevalence was high (CH, 97%; TCH, 97%, Kappa=0.86, 95%CI=0.74–0.98); agreement for hypertension prevalence was lower (CH, 86%; TCH, 82%, Kappa=0.05, 95%CI=-0.04–0.15) at all facilities. Agreement was moderate for EGA (CH, 89%; TCH, 90%); the median difference for records not in agreement was one week (range=1–6 weeks).

**Conclusions:** Birth certificate data were highly accurate for NICU admissions and diabetes. Accuracy of birth certificate maternal hypertension data was only moderate. Staff who complete birth certificate worksheets should be educated regarding alternative terminology used to document maternal hypertension.

**Keywords:** birth certificates; hypertension; gestational age; cross-sectional studies

## Poster 28 Hurricane Katrina Deaths — Louisiana, 2005

**Authors:** Joan M. Brunkard, G. Namulanda, R. Ratard

**Background:** Hurricane Katrina struck the U.S. Gulf Coast on August 29, 2005, causing unprecedented damage to Louisiana and Mississippi communities. Our objectives were to verify, document, and characterize Katrina-related mortality in Louisiana and help identify strategies to reduce mortality in future disasters.

**Methods:** We assessed Hurricane Katrina mortality data sources received in 2007 including Louisiana and out-of-state death certificates for deaths occurring during August 27–October 31, 2005 and the Disaster Mortuary Operational Response Team's confirmed victims' database. We calculated age-, race-, and sex-specific mortality rates for Orleans, St. Bernard, and Jefferson Parishes, where 95% of Katrina victims resided. We conducted stratified analyses by parish of residence to compare differences between observed proportions of victim demographic characteristics and expected values based on 2000 U.S. Census data, using Pearson Chi-square and Fisher exact tests.

**Results:** We identified 972 Katrina-related deaths in Louisiana and 15 deaths among Katrina evacuees in other states. Drowning (40%), unspecified injury and trauma (25%), and heart conditions (11%) were the major causes of death among Louisiana victims. Approximately half (49%) of victims were persons aged  $\geq 75$  years. Fifty-three percent of victims were male; 54% were black; and 43% were white. In Orleans Parish, the mortality rate among blacks was 1.5–4 times higher than among whites in all age categories. Persons aged  $\geq 75$  years were significantly more likely to be storm victims ( $P < 0.0001$ ).

**Conclusions:** Hurricane Katrina was the deadliest U.S. Gulf Coast storm in over 75 years. Drowning was the major cause of death and persons aged  $\geq 75$  years were most affected. Future disaster preparedness efforts should focus on timely evacuation of vulnerable populations. Strengthening mortality surveillance might also improve reporting timeliness.

**Keywords:** Hurricane Katrina, mortality, drowning, flooding, disaster preparedness

## Poster 29 Demographic Characteristics of Adult Cigarette Smokers — United States, 2006

**Authors:** Shane P. Davis, C. Husten, A. Malarcher, K. Asman

**Background:** In 2006, an estimated 45.3 million U.S. adults were smokers and one in five deaths was smoking related. To identify populations disproportionately affected by tobacco use, scientists usually determine smoking prevalence among various demographic groups; however, these data are sometimes misinterpreted as meaning that these groups comprise the largest proportion of smokers. Determining the distribution of demographic characteristics among smokers can also aid in identifying groups most in need of interventions.

**Methods:** Using data from the 2006 National Health Interview Survey, an annual household survey of the U.S. civilian, noninstitutionalized population aged  $\geq 18$  years ( $n = 24,275$ ), we examined the distribution of select demographic characteristics (age, sex, education, race/ethnicity, income) among current smokers (adults who smoked  $\geq 100$  cigarettes in their lifetimes and now smoke everyday or some days). Data were weighted proportions to provide national estimates.

**Results:** 20.8% of U.S. adults were current smokers; Of these, 74.4% were non-Hispanic whites, 12.7% non-Hispanic blacks, 9.7% Hispanics, 2.2% Asians, and 1% American Indians/Alaskan Natives; 55.3% were men and 44.7% women, with Hispanic (11.9%) and Asian (3.1%) men accounting for a larger proportion of smokers than Hispanic and Asian women (7.0% and 1.2%, respectively); 30% had a high school education and 30.1% had some college; 42% were aged 25–44 years and 35.3% were aged 45–64; 40% had incomes  $\geq 2.5$  times the poverty level.

**Conclusions:** Analyses indicated that the demographic profile of the cigarette smoking population is similar to the general U.S. population. Given this, these findings highlight the importance of assessing both smoking prevalence within demographic groups and examining the demographic distribution of smokers in order to complement interventions that target high-risk demographic groups with population-based interventions.

**Keywords:** tobacco, adult, demographics, prevention, control

**Poster 30**  
**Pilot of the CDC Natural Disaster Surveillance Morbidity Report Form for Acute Care Setting — Georgia, July–August 2007**

**Authors:** Leslie B. Hausman, A. Wolkin, R. Noe, S. Cookson, S. Trimble

**Background:** Surveillance for injuries and illnesses following a natural disaster is important in reducing morbidity and mortality. During a natural disaster response, well-developed and standardized surveillance tools are needed to accurately describe the distribution of injuries and illnesses, rapidly detect outbreaks, and to implement timely interventions. We piloted the CDC Natural Disaster Surveillance Morbidity Report Form to validate the usefulness of the form and the quality of data it collects.

**Methods:** Between July 25 — August 7, 2007, we enrolled all patients seen in two emergency departments (ED) in Georgia. Local public health nurses completed the CDC Natural Disaster Surveillance Report Form for each ED patient during triage. The form captured demographics and reason for visit, such as, acute illness and injuries. Using Kappa (K) statistics, we measured the agreement between data collected on CDC's form and chief complaint recorded on the admission form in the ED.

**Results:** We captured 2,154 ED patients using the form. Sixty-five percent of the patients were classified as having an acute illness and 14% were classified as having an injury. Agreement was very good for injuries (K=0.84, 95% confidence interval [CI] =0.79-0.88) and cardiovascular illness (K=0.81, 95% CI =0.75-0.86), good for gastrointestinal illness (K=0.63, 95% CI =0.55-0.70) and motor vehicle crash (K=0.78, 95% CI =0.68-0.88), and fair for chronic respiratory disease (K=0.23, 95% CI =-0.04-0.50).

**Conclusions:** In general, the form accurately described patients' injuries and illnesses with very good to fair agreement compared with ED chief complaints. Findings suggest, with modifications to the form to increase sensitivity for chronic diseases, the form can be used to provide data needed to guide public health interventions during a natural disaster.

**Keywords:** disasters, morbidity, epidemiology, syndrome, disaster planning

**Wednesday, April 16, 2008**  
**Session J: Wild Thing — Vectorborne/ Zoonotic Diseases**  
**Ravinia Ballroom 1:30 a.m.–3:45 p.m.**  
**Moderator: Lonnie King**

**1:35**  
**Zika Virus Outbreak — Yap, Federated States of Micronesia, 2007**

**Authors:** Mark R. Duffy, T. Chen, W. Hancock, J. Kool, R. Lanciotti, M. Pretrick, M. Marfel, S. Holzbauer, C. Dubray, A. Powers, L. Guillaumot, A. Griggs, M. Bell, O. Kosoy, J. Laven, A. Johnson, A. Panella, M. Fischer, E. Hayes

**Background:** In May 2007, Yap physicians reported an unexplained acute illness outbreak similar to, but not clinically typical of, previously observed dengue. We investigated to determine the etiology and epidemiology of the outbreak.

**Methods:** We defined a clinical case as a Yap resident presenting for healthcare from April 1–July 31, 2007 with acute onset of one or more of the following: rash, arthralgia, or conjunctivitis. Case-patient sera were tested for evidence of arboviral infection. We interviewed residents in 173 (87%) of 200 randomly selected households about illness after April 1, 2007, conducted a sero-survey of consenting household members aged  $\geq 3$  years, and assessed presence of peridomestic mosquitoes and breeding containers.

**Results:** Clinical surveillance identified 197 case-patients. Of 177 case-patients providing serum, 15 (8%) had Zika virus (ZIKV) nucleic acid detected, 33 (19%) had antibody evidence of recent ZIKV infection, and 59 (33%) had evidence of recent flavivirus infection that could not be definitively confirmed as ZIKV. Laboratory-confirmed ZIKV cases resided in 9 of 10 municipalities. No deaths or hospitalizations were attributed to ZIKV infection. Of 557 sero-survey participants, 414 (74%) had IgM antibody to ZIKV by enzyme-linked immunoassay. Of these 414, 156 (38%) reported symptoms consistent with the clinical case definition. Among 170 households evaluated, 148 (87%) had mosquito breeding containers present. *Aedes (Stegomyia) hensilli* was the predominant mosquito collected and was present at 145 (85%) households.

**Conclusions:** This first documented ZIKV outbreak increases, from 14, the number of documented ZIKV clinical cases. Symptomatic illness was mild but widespread. Peridomestic mosquito breeding containers should be eliminated to decrease the risk of ZIKV transmission on Yap and the opportunity for ZIKV spread to neighboring islands.

**Keywords:** Zika virus, Federated States of Micronesia, flavivirus, mosquito

1:55

### Net Effect of Numbers: Factors Associated with Usage of Insecticide-Treated Nets in Kenya After Mass Distribution

**Authors:** Jimée Hwang, P. Arguin, S.P. Kachur, A. Wolkon, J. Greenfield, W. Akhwale, R. Kiptui, L. Slutsker, A. Hightower

**Background:** Mass distribution of large numbers of insecticide-treated nets (ITNs) is an important strategy to decrease the burden of malaria in endemic countries. In 2006, Kenya distributed ITNs to children <5 years in a nationwide campaign. Our objective was to determine current ownership and usage of nets in malarious areas of Kenya, with a focus on the factors associated with utilization.

**Methods:** We conducted a nationwide Malaria Indicator Survey in June–July, 2007, during peak malaria transmission season using a personal digital assistant (PDA) based–questionnaire. Using probability proportional to size sampling, we selected 200 villages from 63 malarious districts in seven provinces. After mapping each village using Global Positioning System–equipped PDAs, we randomly selected 36 households per village (survey total 7,200 households). Univariate and multivariate logistic regression analyses were used to identify predictors for net use.

**Results:** Nationally, 64.4% of households owned one or more nets, an increase from 21.8% pre-campaign. The night before the survey, 48.8% of children <5 and 50.1% of pregnant women had slept under a net. Several demographic characteristics were independently associated with net use; however, in both univariate and multivariate analyses the strongest predictor of net use was increasing number of nets in a household, with an adjusted odds ratio of 2.86 (95% confidence interval 2.78–2.94). Households owning only one net had 42.8% use, two nets 61.3%, and three or more nets 70.4%.

**Conclusions:** The Kenya campaign dramatically increased net ownership and use. Further efforts should aim to increase the number of nets distributed to each household and emphasize net education to increase utilization. Additional evaluations should be conducted to better understand the determinants of net usage.

**Keywords:** malaria, insecticide treated nets, utilization, mass distribution, public health evaluation, survey

2:15

### Distinguishing Plague from Posers: Clinical Features Associated with Laboratory-Confirmed *Yersinia pestis* Infections in Rural Madagascar

**Authors:** Ingrid B. Weber, K. Griffith, P. Mead

**Background:** Plague is a bacterial zoonosis caused by *Yersinia pestis*. Human infection is usually fatal and can be contagious if not treated immediately. Among 2,500 human plague cases reported annually worldwide, >80% occur in areas of rural Africa where routine laboratory testing is unavailable.

**Methods:** To identify clinical features that distinguish plague from less serious conditions, we analyzed data from a cohort of 102 Malagasy patients with suspected plague who participated in a treatment trial conducted from January 2004 through March 2007. Enrollment criteria included sudden onset fever ( $\geq 38^\circ\text{C}$ ) with a bubo  $\geq 1\text{cm}$  or clinical suspicion of pneumonic plague. Illness was categorized as “plague” or “not-plague” based on cultures of blood, bubo aspirates, and sputum.

**Results:** Sixty-nine (68%) of 102 enrollees were male; median age was 12 years (range 2 to 73 years). Eighty-nine (87%) patients had suspect bubonic and 13 (13%) suspect pneumonic plague. Plague was laboratory-confirmed in 33 (33%) patients. Patients with plague and not-plague did not differ with respect to age, sex, clinical presentation, heart rate, mean arterial pressure or respiratory rate. However, patients with plague had higher initial temperatures ( $39.7^\circ\text{C}$  versus  $38.7^\circ\text{C}$ ,  $p < 0.01$ ), and were significantly more likely to report diarrhea (30% versus 2%, odds ratio=24.1; 95% confidence interval 2.75 - 210). Mean time from symptom onset to enrollment was longer in patients with plague than not-plague (45 hours versus 26 hours,  $p < 0.01$ ).

**Conclusions:** Although individual clinical differences were few in this study, an algorithm based on multiple clinical features may still be useful for identifying patients with plague in resource-limited areas. However, diagnostic adjuncts for field use (e.g., “dipstick” tests) would further assist in identifying true *Y. pestis* infection.

**Keywords:** *Yersinia pestis*, plague, Madagascar, signs and symptoms, diagnosis

2:35

### Hot Chicks! Multistate *Salmonella* Montevideo Outbreaks Associated with Exposure to Poultry from Mail-Order Hatcheries — United States, 2007

**Authors:** Umid M. Sharapov, C. Barton Behravesh, P. Ettestad, A. Wendelboe, E. Hedican, J. Goplin, A. Garvey, K. Smith, S. Jawahir, C.A. Perry, N. Gaffga, M. Biggerstaff, M. Sotir

**Background:** *Salmonella* infections from live poultry contact are a public health problem. We document two ongoing multi-state outbreaks of *S. Montevideo* infections associated with exposure to mail-order poultry. One outbreak strain was linked with live poultry exposure during 2005 and 2006.

**Methods:** A case was defined as infection with one of two pulsed-field gel electrophoresis (PFGE)-defined *S. Montevideo* strains (Outbreak strain A and B) with illness onset between March 1 and December 31, 2007. Case-patients answered a questionnaire assessing live poultry exposure and sources.

**Results:** One hundred and twenty nine case-patients (64 in Outbreak A, 65 in Outbreak B) were identified from 31 states. Forty-five percent were female; median ages were 5 years (range: 3 months–85 years) for Outbreak A and 24.5 years (range: 2 months–84 years) for Outbreak B. Among 60 case-patients with clinical information, 28 (46%) reported bloody diarrhea, 16 (24%) were hospitalized, and 3 (5%) had bloodstream infection. Fifty-four (75%) of 72 case-patients interviewed reported young poultry exposure within 5 days before illness onset; birds were obtained by mail or from retail feed stores. Ninety percent of poultry linked to illnesses in Outbreak A originated at single New Mexico (NM) hatchery; poultry from Outbreak B originated in 5 hatcheries in 3 states. NM hatchery environmental samples matched Outbreak A strain; poultry and environmental isolates at a patient's residence matched Outbreak B strain.

**Conclusion:** Live poultry from mail-order hatcheries are an ongoing source of *Salmonella* infections in children and adults. This largely unregulated industry poses important challenges to the public health community. New strategies to prevent human infections are needed.

**Keywords:** *Salmonella*, poultry, diarrhea, hatchery

2:55

### Tightening Tiny Turtle Trafficking: A Multistate Outbreak of Human *Salmonella* Paratyphi B (serovar Java) Infections Associated with Small Turtle Exposure — United States, 2007

**Authors:** Julie R. Harris, D. Bergmire-Sweat, J. Schlegel, C. Marin, C. Perry, M. Sotir

**Background:** Turtles and other reptiles are well-known sources of *Salmonella* infections in humans, especially children. Despite a ban on sale of turtles <4 inches in shell length, small turtles are still sold in the United States. In October 2007, state health departments, CDC, and PulseNet (the National Subtyping Network for Bacterial Foodborne Infections) began a multistate investigation of *Salmonella* Paratyphi B L+ tartrate+ (var Java) infections; initial reports linked infections to turtle exposure.

**Methods:** A case was defined as a diarrheal illness occurring between May 1 and November 16, 2007 in a person yielding a *Salmonella* Paratyphi B L+ tartrate+ (var Java) clinical isolate with a PFGE *Xba*I pattern indistinguishable from the outbreak strain. A case-control study was conducted; case-patients and age- and neighborhood-matched controls were asked about exposure to reptiles, including turtles, and knowledge about reptile-associated human *Salmonella* illness.

**Results:** Eighty-three cases were reported from 30 states; 44 (55%) of 81 occurred in children ≤10 years of age. Thirty-seven (61%) of 61 case-patients and 2 (4%) of 47 controls reported turtle exposure during the week before illness onset (matched odds ratio = 40.9, 95% CI = 7.0 – unbounded,  $p < 0.0001$ ). Thirty-one (84%) turtle-exposed case-patients reported exposure to a turtle <4 inches in length. A similar proportion of case patients (23%) and controls (29%) reported awareness of a link between reptile contact and human salmonellosis ( $p = 0.64$ ). Isolates from five pet turtles or turtle habitats yielded the outbreak strain.

**Conclusion:** Turtle exposure was strongly associated with the infections in this outbreak; most patients reported exposure to turtles <4 inches in length. Current public education efforts may be insufficient to prevent turtle-associated *Salmonella* infections in the U.S.

**Keywords:** reptiles, turtles, *Salmonella*, children

3:15

**Cutaneous Anthrax Associated with Drum-Making by Using Goat Hides from West Africa — Connecticut, 2007**

**Authors:** Alice Y. Guh, K. Glynn, A. Hoffmaster, K. Martinez, M. Guerra, S. Shadomy, T. Smith, C. Marston, J. Stratidis, D. Barden, K. Purviance, M. Cartter, J. Hadler

**Background:** *Bacillus anthracis* is a zoonotic and bioterrorism agent that can cause severe illness, death, and environmental contamination. In 2006, inhalation anthrax occurred in two drum-makers who had each worked with unprocessed West African goat hides. In August 2007, the Connecticut Department of Public Health was notified of suspect cutaneous anthrax involving a drum-maker working with unprocessed goat hides from Guinea and his child. We investigated to confirm the diagnosis, determine sources of exposure, and extent of dissemination of anthrax spores.

**Methods:** The drum-maker and his wife were interviewed. Case-patients' skin biopsy specimens were obtained. All hides and drumheads were cultured. Environmental testing was conducted in the drum-maker's work shed, house, and car used to transport the hides.

**Results:** The drum-maker scraped and sanded hides to make drumheads. He routinely used personal protective equipment (PPE) (e.g., designated shoes, clothes, dust masks, and gloves) and minimized household cross-contamination by not bringing PPE indoors. Two exceptions — once wearing short sleeves while sanding and once wearing PPE into the home — plausibly accounted for each case-patient's exposure. Positive *B. anthracis* results included biopsy specimens (by polymerase chain reaction for both patients and immunohistochemistry for the child), a recently sanded drum, 18/70 house samples, the car trunk, and 16/16 work shed samples. All tested isolates were genotype 1.

**Conclusions:** This third anthrax case in a drum-maker likely occurred from working with unprocessed goat hides from Guinea. Using PPE might have prevented inhalation anthrax. The child was likely exposed from household cross-contamination. Drum-makers should be aware of the occupational risk for anthrax and the potential for exposing others. Preventive methods include use of PPE and safer sources of hides.

**Keywords:** anthrax, *Bacillus anthracis*, animal hides, West Africa

Wednesday, April 16, 2008

**Session L: Field Epidemiology — Translating Science into Practice Around the World International Night**

**Dunwoody Suites 7:30–9:35 p.m.**

**Moderators: Roger Glass and Roberto Flores**

7:35

**Cervical Cancer Epidemiology in Fiji, 2004–2007 — Informing Human papillomavirus Vaccine Policy**

**Authors:** Irwin C. Law, F. Russell, J. Samuela, J. Fong, E. Buadromo, M. Patel, K. Mulholland

**Background:** Although developing countries account for over 80% of incident cases of cervical cancer globally, there are no published studies on its incidence in South Pacific countries. With the Fijian Ministry of Health (MoH) and WHO, we investigated the epidemiology of cervical cancer in Fiji to inform policy on the new human papillomavirus (HPV) vaccine.

**Methods:** Nationwide data of histologically-confirmed cervical cancer (incident cases), associated deaths and Pap smear results in women aged 20–69 years, between January 2004 and October 2007, were collected and analyzed from all pathology laboratories, cancer and death registries. We estimated the age-adjusted incidence per 100,000, corresponding 95% confidence intervals (CI) and coverage rates with census data. Capture-recapture methodology will be applied (in progress) to estimate the number of women not detected by the data sources.

**Results:** There were 413 women confirmed with cervical cancer (median age: 50 years, range 22–90). The incidence in Indigenous Fijians (65.7/100,000, 95%CI 57.7–74.5) was significantly higher than in Indo-Fijians (38.4/100,000, 95%CI 32.1–45.3), as was mortality (33.6/100,000, 95%CI 28.0–40.1 compared with 17.0/100,000, 95%CI 13.0–21.9, respectively). Rates did not change with time. Of these 413 women, 186 (56%) died by the end of 2006. The number of Pap smears (n=59,383) reflect coverage of only 9.6% (95%CI 9.5–9.8) of the target population, with 4868 (8.2%) smears classified as abnormal.

**Conclusions:** This first systematic study of cervical cancer in the region shows that the incidence is very high, and Pap smear coverage to be very poor. The variation in incidence and mortality between ethnicities highlights a need to explore this disparity. In addition to strengthening the Pap smear screening programme, Fiji should introduce the HPV vaccine.

**Keywords:** cervical cancer, human papillomavirus (HPV), Papanicolaou smear, epidemiology, immunization, Fiji

7:55

### Human Immune Deficiency Virus (HIV) Outbreak Investigation Among Hospitalized Children — Shymkent City, Southern Kazakhstan Region, June–November 2006

**Authors:** J. Gulmira Sailybayeva, A. Kaspirova, A. Kuatbayeva, S. Ajeilat, A. Jumagulova, M. Favorov

**Background:** Between January–June, 2006, 15 HIV infected children were identified in pediatric hospitals in Shymkent in Kazakhstan. To determine the magnitude of the outbreak, the Ministry of Health conducted an HIV sero-survey in Shymkent among children aged  $\leq 2$  years with history of hospitalization after Jan 1, 2006 (n=7954). We used the sero-survey as the source for a case-control study to identify factors associated with HIV infection.

**Methods:** HIV status was determined based on the 1999 CDC case definition for children. Twenty-eight HIV-positive children born to HIV-negative mothers and 195 randomly selected HIV-negative children were investigated. Information on factors that might have occurred in healthcare settings and at home was ascertained from children's polyclinic charts and hospital records. Medical care providers and blood donors for the 28 infected children were screened for HIV and medical practices were reviewed. Logistic regression was used to assess associations between risk factors and HIV infection.

**Results:** Of the 28 infected children, 27 (96%) had received intravenous (IV) fluids, 20 (71%) subclavian vein catheterization (SVC), and 16 (57%) blood products. Twenty (71%) were males, all uncircumcised. In multivariate analysis, factors associated with infection were: receiving IV fluids (OR=8.8, 95%CI=1.03-76.2), SVC (OR=3.7, 95%CI=1.2-11.5); other factors were not significant. Medical care providers and 81 available blood donors (total 89) were HIV-negative. In hospitals, unsafe techniques for administration of IV medications and the use of reusable equipment for catheterization were observed.

**Conclusion:** This study indicates that the administration of IV fluids and SVC were associated with infection among children, possibly because of unsafe practices. Measures were implemented to ensure safety of the administration of transfusion materials and sterilization of reusable medical equipment.

8:15

### Large Epidemic of Hantavirus Infections in Baden-Wuerttemberg, Germany, 2007

**Authors:** H. Christian Winter, S.O. Brockmann, I. Piechotowski, J. Koch, K. Stark, G. Pfaff

**Background:** In Baden-Wuerttemberg 1116 laboratory-confirmed human Puumala virus (PUUV) infections were notified in 2007 compared to an annual mean of 96 notifications in the previous five years. PUUV is the predominant Hantavirus in Europe, carried by bank voles. It causes a mild form of hemorrhagic fever with renal syndrome. We conducted a survey to describe the clinical impact of the disease and a case-control study (CCS) to identify risk factors for acquiring PUUV.

**Methods:** We included notifications with disease onset between April 1st and June 30th (CCS), or until December 31st (survey), 2007. Case-patients were interviewed about clinical outcome and case-patients and randomly recruited controls (matched for sex, age-group and place of residence) about risk factors. We calculated matched odds ratios (MOR) by conditional logistic regression.

**Results:** Of 508 contacted patients, 496 participated (98%). The male/female ratio was 2.4 and the median age was 43 years. Symptoms were fever (92%), headache (83%), renal impairment (56%) and hemorrhages (12%); 3.3% required dialysis and 66% were hospitalized (mean stay 9 days). On average 19 days of disease and work absence were reported. Multivariate analysis showed that case-patients were more likely to have seen small rodents or their droppings (MOR 1.9, 95% CI 1.2-3.0), to clean utility rooms (MOR 1.8, 95% CI 1.0-3.4) and to visit forest shelters (MOR 3.9, 95% CI 1.1-14.3).

**Conclusions:** This is the largest PUUV epidemic in Western Europe to date. Even though symptoms of PUUV are milder compared to infections with other Hantavirus serotypes, it results in long durations of disease with a high proportion of hospitalization. This emphasizes the importance of specific public health actions such as rodent control measures in targeted locations and counselling of populations at risk.

**Keywords:** hantavirus, puumala virus, hemorrhagic fever with renal syndrome, nephropathia epidemica, burden of disease

8:35

### First Reported Outbreak of Suspected Green Tobacco Sickness in Brazil: Arapiraca, Alagoas State, Brazil, 2007

**Authors:** P.V. Patricia Oliveira, C. Sihler, L. Moura, J. Sobel, D. Malta, S. Lima, A. Lima, E. Macário, T. Lanzieri

**Background:** Green Tobacco Sickness (GTS), an acute intoxication due to dermal nicotine absorption in tobacco harvesters, is characterized by weakness, headache, nausea, vomiting, dizziness, and other symptoms. In the tobacco producing area of Arapiraca, a seasonal increase of acute intoxication during August-September has been observed since 2004. Since tobacco leaves are primed during these months when pesticide use is lower GTS was suspected.

**Methods:** A matched case-control study (1:1) was performed. Cases of acute intoxication (dizziness, nausea, vomit, weakness, headache) among persons with contact with tobacco culture were prospectively identified in health units during August 1st-September 25th and had a urine sample collected for cotinine (nicotine metabolite) levels using high performance liquid chromatography. Controls were persons in the household or neighborhood with contact with tobacco culture without any symptom seven days before the interview who collected urine samples.

**Results:** Of 107 cases, 57 (53%) were males and the median age was 21 years (range: 8-58 years). The main symptoms were dizziness (90%), weakness (88%), vomiting (83%), nausea (82%) and headache (58%). In the univariate analysis, factors significantly associated with illness were male gender (mOR=2.2;95%CI=1.3-4.0), non-smoking (mOR=5.0;95%CI=2.1-12.3), working on a tobacco farm (mOR=3.4;95%CI= 1.2-11.8), priming tobacco leaves (mOR=2.7;95%CI=1.3-5.7), and working with tobacco for <5 years (mOR=3.5;95%CI=1.5-8.9). Barning tobacco was protective (mOR= 0.3;95%CI=0.1-0.6). In the conditional logistic regression model, illness remained associated with male gender (mOR=2.0;95%CI=1.1-3.9), non-smoking (mOR=5.2;95%CI=1.9-14.2) and working in tobacco farm (mOR=3.5;95%CI=1.1-11.8).

**Conclusions:** Being a non-smoker and working in tobacco farm were independently associated with illness, thus the clinical GTS diagnosis is reliable despite pending laboratory results. Recommendations included implementing acute intoxication surveillance in these areas and promoting use of protection measures during tobacco harvesting.

**Keywords:** green tobacco sickness, tobacco, case-control study

8:55

### Cutaneous Anthrax Outbreak in a Village of West Bengal, India, 2007: The Danger of Unsafe Handling of Infected Cow Meat

**Authors:** Tapas Kumar Ray, M.V. Murhekar, Y. Hutin, M.D. Gupte

**Background:** Following the slaughter of three ill cows in July and August 2007, three clusters of suspected cutaneous anthrax were reported in Charbinpara village, Murshidabad, West Bengal. We investigated these clusters to identify the agent, the mode of transmission and to formulate recommendations for prevention.

**Methods:** We defined a suspected case of anthrax as the occurrence of characteristic painless skin lesion (papule, vesicle or eschar) that appeared between July and August and searched the village for cases door to door. We described the outbreak by time, place and person. We collected vesicular fluid from the skin lesions for microscopic examination and culture. Among affected households, we compared the incidence of illness according to various exposures to the suspected meat through relative risks (RR), 95% confidence intervals (CI) and population attributable fraction (PAF).

**Results:** We identified 44 cases of anthrax among 835 villagers (Attack rate: 5%). We identified *B. anthracis* in two patients and isolated the organism in one. Attack rates were higher among individuals aged 15-45 years (23/393, 6%) and males (32/413, 8%). Slaughtering ill cow (RR=19, 95% CI=12-30; PAF: 41%), distributing meat (RR:12, 95% CI=7-20; PAF:20%) and carrying skin (RR=8, 95% CI= 2-32; PAF:2%) were associated with illness.

**Conclusions:** Three clusters occurred sequentially in the village in the absence of secondary prevention measures. Direct exposure to slaughtered animal meat was associated with illness. We recommended early reporting of clusters for action, abstaining from slaughtering ill animals and personal protection measures while slaughtering or handling raw meat.

**Keywords:** cutaneous anthrax, outbreak, India

**9:15**  
**Influenza Surveillance — Vietnam, 2006–2007**

**Authors:** Nila J. Dharan, N.B. Nguyen, N.T. Chung, H.V. Dong, L.T.Q. Mai, J. Mott, D. Shay, P. Cheng, D. Dennis, T.C. Yen, N.T. Hien

**Background:** Influenza causes an estimated 3-5 million cases of severe illness and 250,000-500,000 deaths worldwide each year. Few data are available on influenza disease burden and epidemiology in tropical and subtropical countries. In January 2006, the Vietnam Ministry of Health established a national influenza sentinel surveillance system in order to better understand the national disease burden and epidemiology of influenza.

**Methods:** The National Project on Influenza Surveillance collects epidemiologic data and laboratory specimens from persons of all ages presenting with influenza-like illness (ILI) at 12 sentinel sites in four regions of Vietnam. ILI is defined as: fever >38 AND either sore throat or cough AND no other cause identified for the disease. Throat swab specimens are tested for influenza by real-time RT-PCR.

**Results:** From January 1, 2006 to June 30, 2007, 149,106 (17%) of 861,607 patient visits were for ILI. A respiratory specimen was collected from 7,398 (5%) of the ILI cases and 1,450 (20%) were PCR-positive for influenza (subtypes A(H1N1) (40%), A(H3N2) (31%) and B (28%)). The proportion of specimens testing positive for each subtype peaked earliest in the southern region compared with the three other regions of Vietnam, and each subtype had distinct fluctuations in peak activity over time. Of the 1,450 viruses identified, 115 were submitted to the WHO Global Influenza Surveillance Network.

**Conclusions:** In 2006-2007, a system of sentinel influenza surveillance in Vietnam demonstrated that ILI is an important cause of visits to health care facilities at all levels, identified 1,450 influenza viruses, submitted a subset to WHO for virus strain selection, and provided information on the seasonality of influenza. The system provides a platform to expand understanding of influenza in Vietnam.

**Keywords:** influenza, surveillance, Vietnam, seasonality

**International Night Poster Session**  
**Viewing, 6:30–7:30 p.m.**

**Poster 1**  
**Here We Go Again: Another *Shigella* Outbreak, Cavite, Philippines — July 2007**

**Authors:** Eleanor L. Repatacodo, J. Feliciano, E. Mayor, N. Soriano, J. Pabellon, G. Samonte, N. Orosco, J. Lopez, E. Tayag

**Background:** Since the first documentation of a *Shigella* outbreak in the Philippines in January 2007 a few more towns started having the same experience. On July 5, 2007, the National Epidemiology Center (NEC) received a report of increasing diarrhea cases in a Cabeza town, 30 km south of Manila. A team was sent to verify the outbreak, identify risk factors among residents, to recommend control measures.

**Methods:** A case-control study was done. A case was any resident or transient of Cabeza town with 3 or more loose stools per day or mucoid/bloody stools; any of the following: fever, abdominal pain, tenesmus, vomiting from June 29 to July 12, 2007. A control was any well resident or transient in the nearest unaffected household, negative on rectal swab culture. Rectal swabs and water samples were sent to the laboratory for analysis.

**Results:** There were 139 cases and 278 controls. Ages ranged from 4 months to 75 years (median 21 years). Twenty-five percent were <10 years old. Risk factors were drinking (OR 11.64, 95% CI=5.77-24.02) and using water from the water district for handwashing (OR 8.88, 95% CI=3.79-21.83) and washing utensils (OR 8.88, 95% CI=3.79-21.83). Seven percent of the rectal swabs were positive for *Shigella flexneri* 2a. Water samples from the water district passed the standard, while 4 household samples failed. The main water tank was < 25 meters away from households, violating the sanitation code.

**Conclusion:** An outbreak of *Shigella flexneri* occurred from drinking contaminated water from the water district. Rehabilitation of the water system is being done. Initiatives on the relocation of the main water tank are being done. No more cases were reported.

## Poster 2

### Factors Associated with Acquiring Sexually Transmitted Infections (STIs) Among Patients in Zvishavane District, Zimbabwe, 2006

**Authors:** Chadambuka Addmore, A. Chimusoro, J.C. Maradzika, M. Tshimanga

**Background:** Contracting Sexually Transmitted Infections (STI) has implications for the patient and partner, which include infertility and HIV infection. Zvishavane recorded a 31% increase in STI cases in 2005. We therefore investigated risk factors associated with contracting STIs.

**Methods:** A 1:2 case control study was conducted. Cases were persons above 15 years diagnosed with an STI at three health facilities in Zvishavane Urban. Controls were patients who visited same facilities for other ailments. An interviewer-administered questionnaire was completed.

**Results:** A total of 77 cases and 154 controls were interviewed. Among both cases and controls STI knowledge was high. Risk factors for contracting STI among patients were alcohol consumption (OR 2.11; 95%CI=1.13-3.91), use of alcohol in order to engage in unsafe sex (OR 3.71; 95%CI=1.79- 7.67), short duration in relationship (OR 4.69; 95%CI=2.61-8.44) and paying or being paid for sex (OR 5.4; 95%CI=2.62-11.11). Protective factors were having less than two sex partners in last three months (OR 0.07; 95%CI=0.03-0.17), less than three sex partners in life (OR 0.16; 95%CI=0.08-0.30), condom use during first intercourse (OR 0.30; 95%CI=0.15-0.60), always condom use (OR 0.21; 95%CI=0.08-0.52), lived with one's sex partner in the past six months (OR 0.41; 95%CI=0.23-0.73), Christian religion (OR 0.38; 95%CI=0.20-0.71), education level (OR 0.59; 95%CI=0.29-0.90) and condom use last sex (OR 0.23; 95%CI=0.11-0.51).

**Conclusion:** STI knowledge did not translate into protective behaviour. STI control should focus on behaviour change communication within the individual context. The district has started individual counseling sessions targeting high risk factors for contracting STIs.

**Keywords:** HIV, sexually transmitted infection, condom use, sexual behavior.

## Poster 3

### Economic Evaluation of Rubella and Control Strategies During an Outbreak in Fortaleza, Brazil, 2007

**Authors:** Daniel M. Mota, H. Beltrão, E. Rossetto, L. Vieira, R. Rodrigues, D. Vilar, T. Lanzieri

**Background:** Rubella is an acute viral infection which most severe complications, resulting from infection during pregnancy, are fetal deaths or birth defects known as congenital rubella syndrome (CRS). The lifetime cost of a single case of CRS is very high compared to the cost of vaccination. We evaluated the costs of rubella and a mop-up campaign during a rubella outbreak in Fortaleza, northeastern Brazil.

**Methods:** Partial economic evaluation using the societal perspective was used to estimate the costs associated with rubella and those of a mop-up campaign performed in a closed community of Fortaleza. Cost-effect ratio was calculated considering the vaccine 95% efficacious.

**Results:** Between January 1st and June 30th, 2007, 148 suspected rubella cases were reported, of which 21 (14%) were confirmed. The median age of confirmed cases was 25 (range: 7-51) years, 12 (57%) were aged 20-29 years; 12 (57%) were females. Rubella virus genotype 2B was isolated. The main symptoms of the confirmed cases were rash (95%), arthralgia/ arthritis (76%), fever (67%), and lymphadenopathy (67%). The estimated cost-of-illness for all 21 cases was estimated at US\$ 7,688.33 (mean: US\$ 366.11 per case), of which 84% due to loss of productivity. The costs of the mop-up campaign were estimated at US\$ 666.19 to vaccinate 577 (96%) persons, corresponding to an average cost-effect of US\$ 1.27 per successful vaccination.

**Conclusions:** This outbreak involved mainly young adults resulting in a substantial loss of productivity. The average cost of the disease per patient was approximately 289 times greater than that of a successful vaccination. Therefore, vaccination efforts to control rubella outbreaks should be promptly initiated to reduce the costs associated with rubella and CRS.

**Keywords:** disease outbreaks, rubella, health care costs, vaccination

#### Poster 4

### Mushroom Poisoning: A Major Food Poisoning Problem in Yunnan, China 2001–2006

**Authors:** Chen Lei, T. Waraluk, L. Lin, L. Xiaoqiang, M. O'Reilly, J. Chuleeporn

**Background:** In Yunnan, China, 17,000 tons of mushrooms are harvested annually. Yunnan is home to at least 150 poisonous species of mushrooms. In 2005, mushroom poisoning events accounted for 41.3% of all food poisoning reported. We undertook a descriptive study of mushroom poisoning in Yunnan from 2001-2006.

**Methods:** We reviewed surveillance data from 2001-2006. In 2004, China established new reporting criteria and report forms. We analyzed all investigation forms submitted from 2004-2006, including data on mushroom species. Prefecture level climatic and demographic data were collected and analyzed for association with mushroom poisoning. Spatial analysis was used to identify counties with higher than expected event rates.

**Results:** From 2001-2003, 9 events including 179 cases and 15 deaths were reported; from 2004-2006, 88 events including 483 cases and 133 deaths were reported. Case fatality was 30.7%. Most (86.6 %) events occurred between May and August. Counties reporting events had higher average rainfall and lower average income compared to non-reporting counties. From 2004-2006, 92.1% of events occurred in rural areas. Two prefectures (Chuxiong and Wenshan) had higher than expected event rates by GIS LISA analysis. The Amanita group (68.6%) was the most commonly implicated type of mushroom; 40 cases (30% of all deaths) died from mushrooms identified as Amanita group.

**Conclusion:** Mushroom poisoning reported in Yunnan has an apparent high CFR and increasing morbidity. Mushroom poisoning was likely underestimated prior to 2004 due to lack of food poisoning reporting criteria. Event-based surveillance has limited sensitivity and probably overestimates CFR. To better understand disease burden, a case-based surveillance system should be implemented. Prevention efforts are hindered by the difficulty of identifying mushroom species in the field.

#### Poster 5

### Influenza Vaccination Coverage Among Persons Aged >60 Years After an Immunization Campaign Offering Free Vaccines: Beijing, China, 2007

**Authors:** Ying Wang, G. Yong-Jun, W. Zhao-Nan, H. Guo-Xian, L. Feng-Ling

**Background:** Influenza is responsible for 90% of the respiratory and circulatory deaths among persons aged >65 years. Influenza vaccine reduces morbidity, mortality, and hospitalizations. The Beijing government initiated an immunization campaign in 2007, including free vaccine offer, to all senior citizens (>60 years). We conducted a survey at the end of the campaign to evaluate vaccination coverage and to identify gaps in vaccination.

**Method:** The sample was selected using the Mitofsky-Waksberg two-stage sampling technique. All persons aged >60 years in the selected families were interviewed. Telephone interviews were conducted of the regular Beijing residents aged >60 years. Influenza vaccination-related questions were asked of the respondents for 2007 and 2006.

**Results:** We interviewed 429 persons from 304 families (response rate: 87%). Vaccination coverage was estimated to be 53% (95% CI: 48%-58%) in 2007, and 20% (95% CI: 16%-24%) in 2006. 93% of the residents knew of the vaccination campaign with free vaccine offer. Of the vaccinated persons, 93% received the vaccine from a nearby community clinic; 46% received the vaccination mainly because they believed that the vaccination prevents influenza, whereas 39% did so mainly because the vaccine was free. Of the 202 persons not vaccinated, 28% thought it was not necessary, 24% reportedly had contraindication, and 15% felt the time or place were inconvenient.

**Conclusion:** The influenza vaccination campaign in 2007 reached most of the elderly residents in Beijing, and significantly improved vaccination coverage. To further improve influenza vaccination coverage in Beijing, more efforts are needed to convince senior citizens about the importance of the vaccination and to improve the time and locations of vaccination clinics.

## Poster 6 Performance of Measles Surveillance System in Kenya, 2004–2007

**Authors:** James W. Njeru, J. Lekoona

**Background:** Active case-based Measles surveillance was started in Kenya in late 2002. An electronic database was started in January 2004. This study looks at the performance of the surveillance system from 2004 to 2007.

**Methods:** Analysis of 8072 records captured by the database between January 2004 and September 2007 was done using Epi info statistical package. The data was used to compute 10 key indicators used to monitor the measles surveillance in Kenya.

**Results:** Seven indicators have consistently met the target - Suspected cases annual detection rate: 6.2/100,000 in 2004, 3.4/100,000 by Sept 2007 (target: at least 2/100,000); Districts with at least one case investigated per year: 99% in 2004, 100% in 2007 (target: 80%); Cases notified to district level within 24 hours: 82% in 2004, 88% in 2007 (target: 80%); Cases with blood specimens taken: 99.8% in 2004, 98.7% in 2007 (target: 80%); Specimens collected within 3 days of notification: 82% in 2004, 90% in 2007 (target: 80%); Specimens arriving in lab in good condition: 98.7% in 2004, 98.3% in 2007 (target: 80%); Lab results released in 7 days: 76% in 2004, 99% in 2007 (target: 80%). Three indicators have not met the target - Specimens arriving in lab within 3 days: 57% in 2004, 70% in 2007 (target: 80%); Specimens testing positive for measles IgM: 1% in 2004, 25% in 2007 (target: <10%); National measles immunization coverage: 65% in 2004, 79% in 2007 (target: 80%)

**Conclusion:** These results show a highly efficient surveillance system. However, more efforts should be directed at improving the immunization coverage and specimen transportation process.

**Keywords:** measles, surveillance, performance, indicators

## Poster 7 Effects of a Comprehensive Law Banning Smoking in Enclosed Spaces in the Province of Trento, Italy 2005–2006

**Authors:** Pirous Fateh-Moghadam, L. Ferrari, V. Bertozzi

**Background:** In January 2005, Italy banned smoking in all enclosed spaces open to the public, including offices, bars, restaurants, clubs, and discos. To examine effects of the law at local level in the Province of Trento, we used data from various sources including Studio PASSI 2005.

**Methods:** Data sources included cigarette sales-data from the Trentino-Alto Adige region (which includes a second province, Bolzano), data from Studio PASSI 2005, a cross-sectional survey conducted at local level as a pilot study for the current national behavioural risk factor surveillance system with the objective of testing methods and logistics of data collection on health behaviours, and data from a local 2006 cross sectional survey on smoking which included the smoking section of the PASSI questionnaire.

**Results:** Compared to 2004, cigarette sales in Trentino-Alto Adige declined 8.8% in 2005, the equivalent of 5.6 million packs of cigarettes; the national average reduction was 5.4%. Studio PASSI 2005 demonstrated that 31% of smokers in Trento reported smoking less and 21% had tried to quit smoking as a result of the law. In the 2006 local survey, 32% reported smoking less, 18% had tried to quit, and 25% of those who quit after the ban reported that the law had influenced their decision.

**Conclusion:** The smoking ban was effective and resulted in a reduction of cigarette consumption in Trentino-Alto Adige. The transformation of PASSI in the current surveillance system will permit ongoing monitoring of smoking behaviour at local level.

**Keywords:** smoking behavior, smoking ban, effectiveness, Italy

## Poster 8

### Could a High Number of Social Contacts in the Health-Care Sector Lead to Staff Shortage During an Influenza Pandemic? Comparing Social Contact Data of Bavarian Health-Care Workers and the German General Population

**Authors:** Helen Bernard, R. Fischer, R. Mikolajczyk, M. Kretzschmar, M. Wildner

**Background:** Health-care workers (HCWs) are likely to be at higher risk for close-contact infectious diseases like influenza due to close interaction with vulnerable population subgroups. During a pandemic this might result in a staff shortage. Some mathematical models of pandemics incorporate social contacts to account for disease dynamics, however, no model includes data from the health-care sector (HCS). The aim of this study was to assess social contact data of HCWs and compare them with data from the general population in order to permit modeling disease spread and staff capacity in the HCS during pandemics.

**Methods:** We asked 160 HCWs from internal medicine and surgery departments of five Bavarian hospitals to record their social contacts (conversation only or conversation including physical contact) in a diary over 24 hrs. The diary included age and gender of each contact person, place, duration, and intensity of contact. We selected one age- and gender-matched control for each HCW from a study conducted earlier in a representative sample of the German population based on the same diary.

**Results:** Between April and July 2007, a total of 131 (82%) HCWs completed a diary. For 129/131 we found a matching control. Matched HCWs reported an average of 39 contacts (85% work-related) vs. 21 (73% work-related) among controls (mean difference 18, Wilcoxon-test  $p < 0.0001$ ). Of the work-related contacts among HCWs, 44% were over 15 minutes, 51% involved physical contact, and 38% were with  $\geq 60$  year-olds.

**Conclusions:** We found a higher number of social contacts among HCWs than in the general population. Future models of pandemic spread of close-contact infectious diseases should take the HCS into consideration to make predictions about available work-forces in this sector during a pandemic.

**Keywords:** influenza, human; pandemics; computer simulation; health care sector; social contact

## Poster 9

### Mothers and Health Workers Can Influence Adolescent Girls with Reproductive Tract Infection for Them To Seek Care in Government Facilities — South 24-Parganas, West Bengal, India, 2007

**Authors:** Shyamali Rudra, R. Ramakrishnan, Y. Hutin, M.D. Gupte

**Background:** More than 5% adolescents in India contract reproductive tract infection (RTI) each year. Adolescent girls poorly use effective treatment available in government health facilities. We studied the factors associated with seeking treatment in government facilities among adolescent girls with RTI.

**Methods:** We sampled 1,008 adolescent girls in 40 clusters in a cross-sectional study to estimate the prevalence of RTI symptoms. Among those with RTI in last six months, we conducted a retrospective cohort study to compare the frequency of seeking treatment in government facility among those with and without selected characteristics through relative risks (RR) and their 95% confidence intervals (CIs). We generated a multivariate logistic regression model to identify characteristics were significantly associated with the outcome of interest.

**Results:** Of 1,008 girls, 557 had symptoms of RTI in last six months (period prevalence 55%). Among them 17% (95/557) did seek treatment in government facilities. Seeking in government facilities was more common among girls whose mother had primary education (RR 6.6, 95% CI 4.7-9.2) and those whose home was visited by the community health worker (RR 2.5, 95% CI 1.5-4.1). 63% of the 95 adolescent girls who visited a government facility had been advised by their mothers. Multivariate analysis indicated that visiting a health facility for other reasons ( $p < 0.0001$ ), mother's education ( $p < 0.0001$ ), good communication with the mother ( $p = 0.01$ ), feeling comfortable with health-worker ( $p = 0.02$ ) and health worker home visits ( $p = 0.028$ ) were independently associated with seeking treatment in government facilities.

**Conclusion:** Mothers and community health workers play a key role to increase the use of government facilities among adolescent girls with RTI. We proposed behavior-change communications targeting mothers and counseling by the health worker at home level as interventions to improve the use of services by adolescent girls with RTI.

**Keywords:** adolescents, reproductive tract infection (RTI), government health facility

**Poster 10**  
**Malnutrition Prevalence Among Less Than Five-Year-Old Children of Xinca and Impact of Its Research in Maternal-Infant Program — Santa Rosa, Guatemala, December 2005**

**Author:** Lissette E. Reyes

**Background:** Guatemala has a high prevalence of malnutrition in children <5yrs old, particularly among its Indian population. The prevalence of malnutrition in the Xinca population, who reside mainly in Santa Rosa, is unknown. We implemented a study to determine the prevalence of and risk factors for malnutrition in the Xinca.

**Methods:** We conducted a cross-sectional study of the entire <5-year old Xinca population in Santa Rosa. We interviewed parents and caretakers collecting demographic, social-economic, and environmental data. Pediatric scales were used for infants and vertical scales for older children. Anthropometric calculations were made with Nutstat using the Gomez classification.

**Results:** No growth monitoring program existed and prenatal care attendance was 30%. Maternal mortality rate was 13 /1,000 live births and <5 yr-old mortality rate was 7/1,000. Among 754 children, the prevalence of acute malnutrition was 21%; chronic, 26%, and global, 70%. Of those with global malnutrition, 37% had light global, 27% mild global and 6% severe global malnutrition. Global malnutrition was greater among girls 79% than boys. Associated risk factors for global malnutrition were: low birth weight OR=4.23 (95%CI =2.35-7.60) and maternal lactation (exclusive) finished during infancy, OR=3.70 (95%CI=2.04-6.75).

**Conclusions:** The prevalence of global malnutrition among Xincas is twice the national rate. Based on these results, health care access was expanded and a reproductive health program was implemented. Prenatal care increased to 95% and growth monitoring to 100%. The maternal mortality rate and <5yr old mortality rate was 0% in 2007. Other interventions that resulted included provision of milk to malnourished infants by a non-governmental, and expansion of the health care center to include an acute treatment room for malnutrition.

**Keywords:** malnutrition, Xinca, maternal-infant program

**Thursday, April 17, 2008**  
**Session M: Mackel the Knife**  
**Mackel Award Finalists**  
**Ravinia Ballroom 8:30–10:15 a.m.**  
**Moderators: Michael McGeehin and James Stephens**

**8:35**  
**Snack Attack: Multistate Outbreak of *Salmonella* Serotypes Wandsworth and Typhimurium Infections Associated with Consumption of a Puffed Vegetable Snack Food— United States, 2007**

**Authors:** Anandi N. Sheth, M. Sotir, G. Ewald, A. Kimura, J. Higa, S. Troppy, S. Meyer, C. Braymen, J. Archer, M. Spayne, M. Hoekstra, E. Daly, J. Austin, P. M. Griffin, and the *Salmonella* Wandsworth Outbreak Investigation Team

**Background:** *Salmonella* Wandsworth (SW) is a rare serotype that had never caused a U.S. outbreak. In May 2007, several states and CDC began investigating an increase in reported SW infections.

**Methods:** We defined a case as SW infection during 2007 in a person with the outbreak strain defined by pulsed-field gel electrophoresis. We identified cases through PulseNet (the national molecular subtyping network for foodborne disease surveillance), used food history questionnaires and open-ended interviews to develop hypotheses, and then conducted a case-control study using age-matched friend controls. State laboratories tested the implicated product from case households and retail stores.

**Results:** We identified 69 cases in 23 states with illness onsets from February 26 to July 4, 2007; 93% were in children aged 10 months to 3 years. Six patients were hospitalized; none died. Thirty-four (97%) of 35 case-patients compared with 8 (28%) of 29 control subjects consumed a puffed vegetable snack food (VSF) [matched odds ratio 23.3, 95% confidence interval 3.7–unbounded]. On June 28, the manufacturer ceased production and recalled VSF. State laboratories isolated the SW outbreak strain from 11 VSF bags and a new strain of *Salmonella* Typhimurium from one bag. PulseNet subsequently identified 18 patients with this *S. Typhimurium* strain; 86% ate VSF during the week before illness onset. The vegetable seasoning mix, added after the baking and puffing steps in VSF manufacture, yielded the SW outbreak strain.

**Conclusion:** Coordinated epidemiologic and laboratory efforts detected the SW outbreak, identified the source, and then detected the *S. Typhimurium* outbreak. A nationwide recall likely prevented additional illnesses. This investigation highlights the risk of salmonellosis from processed, ready-to-eat foods with ingredients added after a lethal-processing step.

**Keywords:** *Salmonella*, outbreak, children, ready-to-eat foods

8:55

### Multistate Measles Outbreak Associated with an International Youth Sporting Event Pennsylvania, Michigan and Texas, August–September, 2007

**Authors:** Tai-Ho Chen, L. Lowe, P. Kutty, J. Blostein, R. Espinoza, C. Kim, J. Sinclair, E. Hunt, M. Nguyen, S. Redd, J. Rota, P. Rota, W. Bellini, D. Payne, P. Lurie, M. Moll, A. Ferraro, V. Urdaneta, C. Dykewicz, S. Ostroff, J. Seward

**Background:** Measles caused an estimated 242,000 deaths worldwide in 2006. Although no longer endemic in the United States as a result of high vaccination coverage, imported measles can cause outbreaks. On August 16, 2007, a measles case was identified at an international sporting event in Pennsylvania. We conducted an investigation to determine the magnitude of the outbreak and to prevent further transmission.

**Methods:** A measles case was defined as febrile rash illness confirmed through detection of IgM measles antibodies, detection of measles virus by viral culture or real-time reverse-transcriptase polymerase chain reaction (RT-PCR). Contact tracing was conducted among airplane passengers, airport workers, event staff and participants, hotel workers and guests. Viral genotyping was performed by comparing nucleotide sequences encoding the nucleoprotein carboxy-terminus to World Health Organization reference sequences.

**Results:** Contact tracing among >1,300 exposed persons identified seven measles cases in three states. The index patient had been exposed in Japan. Two generations of secondary transmission were documented, including to an airplane passenger born before 1957, an airport worker, and two fully immunized college students. One person was hospitalized and no deaths occurred; 186 exposed persons without presumptive evidence of immunity were vaccinated. Viral genotyping, successful for six cases, identified measles genotype D5; 100% nucleotide identity among sequences was consistent with one chain of transmission.

**Conclusions:** Measles remains a highly infectious global disease. Viral genotyping, a key component of measles surveillance, supported a single transmission chain and linkage to a measles D5 outbreak in Japan. This import-associated outbreak highlights the need to maintain high measles vaccination coverage in the United States and to continue global control efforts. Persons without documented measles immunity should receive appropriate vaccination.

**Keywords:** measles, disease outbreaks, travel

9:15

### Investigation of a Multidrug-Resistant *Acinetobacter baumannii* Outbreak — Phoenix, 2007

**Authors:** Cynthia A. Lucero, A. Kallen, J. Noble-Wang, C. Gould, R. Sunenshine, V. Berisha, B. Jensen, A. Shams, M.J. Arduino, A. Srinivasan

**Background:** Multidrug-resistant *Acinetobacter baumannii* (MDR-Ab) is an important and emerging nosocomial pathogen. Infections are associated with increased mortality, hospital stays and costs of care. Previous outbreaks have been linked to cross-transmission between patients and contaminated objects. In June 2007, we investigated an MDR-Ab outbreak involving 13 patients in a community hospital.

**Methods:** We evaluated infection control practices and conducted a cleaning assessment, environmental sampling and a case-control study. Cases were infected or colonized with MDR-Ab diagnosed  $\geq 48$  hours after admission while controls had a negative culture for MDR-Ab. Patient and environmental isolates were typed by pulsed-field gel electrophoresis (PFGE) and multilocus strain typing (ST).

**Results:** The infection control review and cleaning assessment revealed inadequate environmental and equipment cleaning, including mobile radiology machines. MDR-Ab isolates from available case-patients and 2 portable x-ray machines were indistinguishable by PFGE and belonged to a single outbreak strain, ST10. A genetically-related strain (ST12) was recovered from a portable ultrasound machine. Over 50 additional environmental samples were negative for *Acinetobacter*. The median number of portable x-rays in the week prior to culture was higher in cases compared to controls (8 vs.4,  $p=0.03$ ). Antibiotic days, mechanical ventilation days and length of stay were also higher among cases. In multivariate analysis, portable x-ray remained a significant risk factor (OR=1.5, 95%CI=1.03-2.18) when controlling for other possible risks and exposures. The outbreak terminated after portable radiology machines were disinfected, hand hygiene was reinforced and cleaning protocols improved.

**Conclusions:** This is the first report identifying contaminated mobile radiology equipment in the setting of a clonal outbreak. The investigation underscores the importance of thorough and consistent cleaning of shared equipment and staff education in preventing hospital infections.

**Keywords:** *Acinetobacter baumannii*, disease outbreaks, radiography, equipment contamination, infection control, intensive care units

9:35

### Multiple Clusters of Hepatitis C Virus Infections Associated with Anesthesia for Outpatient Endoscopy Procedures — New York City, 2005–2006

**Authors:** Bruce J. Gutelius, J. Perz, M. Parker, R. Hallack, R. Stricof, E. Clement, A. Eramo, Y. Lin, G. Xia, S. Balter, M. Layton

**Background:** Hepatitis C virus (HCV) transmission through intravenous (IV) anesthesia might be increasing as outpatient procedures increase. When acute hepatitis C occurred in a patient without risk factors in August 2006 after anesthesia by Anesthesiologist A for outpatient endoscopy, we investigated to determine exposure source.

**Methods:** We inspected the clinic treating the index patient (Clinic 1), observed endoscope reprocessing, evaluated anesthesia methods, and interviewed staff. Using clinic billing data, we contacted patients who had procedures within 1 day of the index patient for interviews and HCV testing. Using Anesthesiologist A's billing data, we contacted 4,490 patients treated at 10 clinics during 12/1/03–5/1/07 to recommend HCV testing. Outbreak-associated HCV case-patients had anti-HCV antibody, anesthesia from Anesthesiologist A, and  $\geq$ one of the following: no major lifetime HCV risk factors, seroconversion  $\leq$ 6 months after anesthesia, or symptomatic HCV infection 2–26 weeks after anesthesia. Molecular relatedness of HCV strains was examined by genotyping, NS5b sequencing, and quasi-species analysis.

**Results:** Testing at Clinic 1 identified six outbreak-associated cases on 2 consecutive procedure days; each day's cases immediately followed a chronic HCV patient's endoscopy. Anesthesiologist A reported possible syringe reuse. Testing of 841 patients after notification letters identified a case occurring on 6/3/05 in a second endoscopy clinic. In both clinics, viremic cases had NS5b RNA sequences  $\geq$ 98% identical to HCV from the chronic HCV patient preceding them; quasi-species analysis supported patient-to-patient transmission. Receiving IV propofol from Anesthesiologist A was the only common characteristic among cases.

**Conclusions:** Syringe reuse with multidose vials likely caused this outbreak at two endoscopy clinics. Aseptic IV anesthesia technique is essential. Genetic HCV analyses are beneficial to confirm epidemiologic findings, particularly with limited clusters.

**Keywords:** Hepatitis C, anesthesia, syringes, propofol, infection control, multidose vials

9:55

### Not the Conventional Dogma: Multistate Outbreak of Human *Salmonella* Serotype Schwarzengrund Infections Caused by Contaminated Dry Dog Food — Northeastern United States, 2006–2007.

**Authors:** Casey Barton Behravesh, T. Ayers, R.M. Hoekstra, A. Ferraro, M. Deasy, M. Moll, E. Villamil, P. Gerner-Smidt, J.L. Austin, I.T. Williams, and the *Salmonella* Schwarzengrund Outbreak Investigation Team

**Background:** Most *Salmonella* infections are acquired by handling or consuming contaminated food products or contact with animals. Forty-three million (37.2%) U.S. households own a dog and many feed dry dog food. Human *Salmonella* infections associated with dog food have never been described. PulseNet, a national bacterial subtyping network, detected an outbreak of human *Salmonella* Schwarzengrund infections which we investigated in July 2007.

**Methods:** We conducted a multistate case-control study, using geographically-matched control households. A case household was defined as having a member infected with the outbreak strain of *Salmonella* Schwarzengrund with illness onset between 01/01/06–09/28/07. Information on animal-related exposures including brands of pet food purchased was collected. Open bags of dog food, dog fecal specimens, environmental specimens, and dog food manufactured at Plant X were cultured for *Salmonella*.

**Results:** Seventy cases were identified in 19 states; 43 case and 144 control households were enrolled. Dog contact was reported by 79% (34/43) of case households (matched odds ratio [mOR]=2.7, 95% confidence interval [CI]=1.04,7.7). Case households were significantly more likely to usually purchase a brand of dry pet food produced by Manufacturer X than control households (mOR=7.8, 95% CI=2.6, 27.8). The outbreak strain was isolated from opened bags of dry dog food produced at Plant X, fecal specimens from dogs that ate Manufacturer X dry dog food, as well as an environmental sample and finished dog foods from Plant X.

**Conclusions:** Dry dog foods produced by Manufacturer X under several brand names caused human illness. PulseNet, environmental, and product laboratory findings were crucial in guiding the epidemiologic investigation resulting in the first ever identified outbreak of human illness linked to household use of dry dog food.

**Keywords:** *Salmonella*, outbreak, public health, zoonoses, dog, canine

**Thursday, April 17, 2008**  
**Session N: Do You Really Want To Hurt Me?**  
**— Healthcare-Associated Illness**  
**Ravinia Ballroom 10:30 a.m.–12:00 p.m.**  
**Moderators: Cliff McDonald and**  
**Arjun Srinivasan**

**10:35**  
**Cystoscopy-Related *Pseudomonas aeruginosa***  
**Outbreak — New Mexico, 2007**

**Authors:** Aaron M. Wendelboe, PhD; J. Baumbach, D.B. Blossom, P. Frank, A. Srinivasan, C.M. Sewell

**Background:** *Pseudomonas aeruginosa* causes 11%–23% of nosocomial infections worldwide. Five cases of *P. aeruginosa* bacteremia among older men were reported to the New Mexico Department of Health on March 29, 2007, three had had outpatient cystoscopy performed by the same urologist before infection. We investigated to identify risk factors and implement control measures.

**Methods:** We reviewed infection control procedures and performed environmental sampling at the urologist's office. We conducted a 1:2 unmatched case-control study by using hospital laboratory records. Case-patients had blood or urine cultures positive for *P. aeruginosa* during January 1–April 22, 2007. Control subjects had blood or urine cultures ordered through the same laboratory. Clinical and environmental isolates were typed by pulsed-field gel electrophoresis (PFGE).

**Results:** Twenty-three case-patients were identified, 17 with urinary tract infections alone, two with bacteremia alone, and four with both. Overall, seven case-patients experienced *P. aeruginosa* infections after cystoscopy by this urologist. In multivariate analyses, cystoscopy by this urologist was the strongest risk factor for positive *P. aeruginosa* culture (odds ratio=46.5; 95% confidence limits=3.1, 705). Recent hospitalization, having a urinary catheter, and age  $\geq$ 75 years were also independently associated with case status. Multiple breaches in cystoscope reprocessing procedures were identified. The urologist's cystoscope was culture-positive for *P. aeruginosa*. All four available clinical isolates from case-patients cystoscoped by this urologist had identical PFGE patterns to specimens from the cystoscope. Implementation of correct reprocessing methods terminated the outbreak.

**Conclusions:** Our investigation implicated a contaminated cystoscope as the likely source of these infections. Health-care personnel who disinfect cystoscopes should follow manufacturer recommendations and guidelines on reprocessing flexible endoscopes. Development of cystoscope-specific guidelines might promote increased compliance with correct reprocessing procedures.

**Keywords:** case-control studies, epidemiology, disinfection, infection control, rural health

**10:55**  
**Outbreak of Late-Onset Group B Streptococcus in a**  
**Neonatal Intensive Care Unit — Tennessee, 2007**

**Authors:** Jennifer K. MacFarquhar, B. Beall, A. Woron, M. Kainer, C. Whitney, W. Schaffner, T. Jones

**Background:** Late-onset Group B Streptococcus (GBS) disease is the most common cause of meningitis among newborns aged 7–90 days and is spread from person to person. On September 10, the Tennessee Department of Health was notified of an outbreak of late-onset GBS sepsis in a neonatal intensive care unit (NICU). We investigated to determine the source of infection and prevent additional cases.

**Methods:** We defined a case as a culture-confirmed late-onset GBS infection, during August 15–September 15, 2007, in a neonate aged  $\geq$ 7 days. A retrospective review of patients' and mothers' charts was performed. We examined all 2007 NICU microbiology reports for GBS and performed serotyping, pulsed-field gel electrophoresis (PFGE), and multilocus sequence typing (MLST) on isolates. We reviewed maternal GBS screening and prophylaxis protocols and infection control protocols, observed staff practices, and performed a point-prevalence survey for colonization.

**Results:** We identified five cases (including three deaths) occurring during August 23–September 6; only one had occurred during the preceding 10 months. Among isolates from these cases, two serotypes, two PFGE patterns, and two distinct MLST patterns were identified. Three case isolates were indistinguishable on PFGE and MLST subtyping. The point-prevalence survey identified four additional GBS-colonized neonates. Multiple potential pathways of transmission were identified, including one neonate with early onset GBS whose isolate was indistinguishable from the three identical isolates on subtyping.

**Conclusions:** This outbreak likely resulted from multiple factors. Novel molecular subtyping (PFGE and MLST), not previously used to characterize this type of outbreak, enabled us to identify this GBS outbreak as multiclinal. Rapid epidemiologic investigation and molecular subtyping resulted in identification of multiple transmission pathways, and implementation of control measures.

**Keywords:** disease outbreaks; intensive care unit, neonatal; group B streptococcus; sepsis; healthcare worker; pulsed-field gel electrophoresis; molecular epidemiology

11:15

### Outbreak of Surgical Site Infections Following Coronary Artery Bypass Graft Surgery — United States, 2007

**Authors:** Sarah F. Schillie, F. Lessa, A. Srinivasan, A. Chiem, A. Shams, J. Noble-Wang, M. Jhung, C. Gould

**Background:** Surgical site infections (SSIs) occur in approximately 300,000 patients annually in the U.S., representing the second most commonly reported nosocomial infection. SSIs are rarely due to *Pseudomonas aeruginosa*. In 2007, Hospital A experienced a 5-fold increase in SSI rates following coronary artery bypass graft (CABG) surgery. *P. aeruginosa* was isolated in half of the cases. An investigation was initiated to identify the cause of infection and recommend prevention measures.

**Methods:** A case-control study was performed. Case-patients underwent CABG surgery between January and September, 2007 and developed a sternal SSI within 45 days. Controls underwent CABG surgery during the same period. Staff were interviewed and infection control practices were observed. Environmental samples were obtained and *P. aeruginosa* isolates from case-patients were typed using pulsed-field gel electrophoresis (PFGE).

**Results:** There were 13 case-patients; seven had deep sternal wound infections and six had superficial sternal wound infections. SSIs were associated with higher perioperative glucose ( $p=0.03$ ) and admission from another facility ( $p=0.02$ ). Multivariable analysis revealed that case-patients had higher odds of having surgery performed by Surgeon B (aOR=4.7, 95% CI=1.02–21.9). This association was supported by staff interviews describing surgeon-specific infection control breaches and a temporal relationship between the increase in infections and Surgeon B joining the hospital staff. No environmental sources of *P. aeruginosa* were identified. PFGE analysis indicated the three *P. aeruginosa* patient isolates available for testing were unrelated.

**Conclusion:** Epidemiologic analysis and interviews suggest that the outbreak was associated with infection control lapses, especially in association with Surgeon B. This outbreak highlights the need for vigilance regarding adherence to recommended infection prevention practices and the importance of calculating and sharing surgeon-specific SSI rates with surgeons.

**Keywords:** hospital outbreak, *Pseudomonas aeruginosa*, coronary artery bypass, wound infection, infection control

11:35

### Multistate Outbreak of *Acanthamoeba* Keratitis Associated with Use of a Contact Lens Solution

**Authors:** Jennifer R. Verani, S. Lorick, J. Yoder, M. Beach, C. Braden, G. Visvesvara, J. Roberts, D. Chang, B. Park, J. Bestudik, S. Chen, J. Saviola, D. Jones, S. Roy

**Background:** *Acanthamoeba* keratitis (AK) is a rare potentially blinding infection of the cornea primarily affecting contact lens (CL) users. Based on increasing case reports by an Illinois ophthalmology center and a survey of 22 ophthalmology centers, we recognized a national increase in AK cases during 2004–2006.

**Methods:** CDC, state and local health departments began a case-control investigation in March 2007 to identify AK risk factors. Culture-confirmed case-patients (illness onset from 01/01/2005 and culture-confirmation before 05/26/2007), their eye-care providers, and control-persons (matched geographically and by CL use) were interviewed by telephone using a standard questionnaire collecting demographic, clinical, and risk factor information.

**Results:** We interviewed 105 of the 158 culture-confirmed case-patients identified in 37 states and 184 matched control-persons. Among case-patients, 36% were male; median age was 29 years; 89% wore CLs. Corneal transplants occurred or were planned for 28%. Case-patients were more likely to report use of AMO Complete<sup>®</sup> Moisture Plus<sup>™</sup> (AMOCMP) CL solution (OR 16.1, 95%CI 5.7–45.3). No significant association was found with other CL solutions. Among 21 case-patients with AMOCMP manufacturing lot information, no lot numbers were identical. Additional risk factors included a history of ocular trauma (OR 7.9, 95%CI 2.2–28.0), CL use <5 years (OR 3.9, 95%CI 2.0–7.6), reusing old solution in CL case (OR 4.6, 95%CI 2.4–8.7), and sometimes/never washing hands before inserting CLs (OR 2.6, 95%CI 1.2–5.5).

**Conclusion:** In addition to behavioral factors, AMOCMP solution was associated with a national outbreak of AK, resulting in an international product recall. The wide temporal and geographic distribution of case-patients and lack of identical manufacturing lots suggests that AMOCMP was not intrinsically contaminated. AMOCMP antimicrobial efficacy studies are underway.

**Keywords:** *Acanthamoeba*, keratitis, contact lens solutions, disease outbreaks, United States

**Thursday, April 17, 2008**  
**Session O: Don't Stand So Close To Me —**  
**Tuberculosis**  
**Ravinia Ballroom 1:30–3:15 p.m.**  
**Moderators: Eugene McCray and**  
**Thomas Navin**

**1:35**  
**Transplantation-Transmitted Tuberculosis —**  
**Oklahoma, 2007**

**Authors:** Emily Piercefield, L. Smithee, M. Kuehnert, T. Harrington

**Background:** The incidence of tuberculosis among organ transplant recipients is up to 74-fold higher than that of the general population and is most often caused by activation of latent tuberculosis infection after immunosuppression. In 2007, after an Oklahoma organ donor's cerebrospinal fluid grew *Mycobacterium tuberculosis* postmortem, we investigated the possibility of transplantation-transmitted tuberculosis.

**Methods:** Medical records of the donor were reviewed for risk factors for tuberculosis; donor contacts were investigated; recipients were evaluated for clinical evidence of tuberculosis; and confirmatory testing for *M. tuberculosis* and tuberculosis genotyping were conducted on donor and recipient specimens.

**Results:** The donor had a history of homelessness and alcohol use and was hospitalized for progressive neurologic illness attributed to cerebral vasculitis. Although he recently had had pneumonia, he had no known history of tuberculosis, and prior tuberculin skin tests were negative. Three organs (liver and two kidneys) were transplanted to three recipients. Disseminated tuberculosis was diagnosed in both kidney recipients and one died. *M. tuberculosis* isolates from the donor and kidney recipients had matching genotypes. The liver recipient had no evidence of tuberculosis. Approximately 100 contacts of the donor, predominantly healthcare workers, were assessed, and no new tuberculosis infections were identified.

**Conclusions:** Organs transplanted from a donor with undiagnosed disseminated tuberculosis resulted in confirmed disease transmission to two of three organ recipients. Although donor medical and social history might reveal risk factors for tuberculosis, no standard screening exists for evaluating potential organ donors for tuberculosis. The risk for transplantation-transmitted tuberculosis infection is low, but consequences can be devastating. Organ procurement organizations and transplant teams should consider the potential for transplantation-transmitted tuberculosis from donors with known risk factors.

**Keywords:** tuberculosis, organ transplantation

**1:55**  
**Impact of Antiretroviral Therapy and**  
**Cotrimoxazole Preventive Therapy on Survival**  
**of HIV-Infected Patients with Tuberculosis —**  
**Cambodia, 2007**

**Authors:** Rinn Song, T. Heller, E. Bunthoeun, K. Nong, J. Varma, K. Cain

**Background:** Tuberculosis (TB) is the leading cause of death among persons infected with the human immunodeficiency virus (HIV). World Health Organization recommends that HIV-infected TB (TB-HIV) patients receive cotrimoxazole preventive therapy (CPT) and antiretroviral therapy (ART) to improve survival, but no studies from Asia have assessed the combined effect of these interventions.

**Methods:** We conducted a retrospective cohort study to determine survival of adults attending three HIV clinics from January 2005 through June 2006 in rural Cambodia. Patients were followed for at least 1 year or until time of death. A multivariate Cox proportional hazards model was used to identify factors associated with death among TB-HIV patients.

**Results:** Of 1,509 HIV-infected patients, 834 (55%) received ART and 1,149 (76%) CPT; 403 (27%) were diagnosed with TB. Median CD4+ T-lymphocyte count (CD4) was 52 cells/ $\mu$ l for TB-HIV patients and 165 cells/ $\mu$ l for those without TB ( $p < .01$ ). Among patients who received neither ART nor CPT, 5/14 (36%) with TB died, compared with 23/163 (14%) of those without TB. Among patients who received both ART and CPT, 26/282 (9%) of patients with TB and 38/419 (9%) without TB died. In multivariate analysis adjusting for CD4 and other covariates, both ART (Hazard Ratio [HR] 0.43; 95% confidence interval [CI] 0.20-0.90) and CPT (HR 0.26; CI 0.09-0.74) were independently associated with reduced mortality.

**Conclusions:** In Cambodia, HIV-infected patients with TB are more immunocompromised and have higher mortality if they do not receive CPT and ART than those without TB. Mortality rates for HIV-infected patients with and without TB are similar when both groups receive CPT and ART. Both ART and CPT should be provided to HIV-infected TB patients.

**Keywords:** tuberculosis, HIV, cotrimoxazole, antiretroviral therapy, treatment outcome

2:15

### Epidemiology of Tuberculosis Among Foreign-Born Children and Adolescents in the United States, 1994–2006

**Authors:** Heather J. Menzies, C. Winston, K.P. Cain, T.H. Holtz, W. Mac Kenzie

**Background:** In 2006, 57% of the 13,779 tuberculosis (TB) cases reported in the United States occurred in foreign-born persons. TB among foreign-born children and adolescents has not been well studied and pre- and post-U.S. entry TB screening efforts have not focused on this group. Therefore, we assessed trends in TB case rates in this population.

**Methods:** We examined case rates of TB among U.S.-born and foreign-born children (<13 years old) and adolescents (13–17 years old) reported to the U.S. National Tuberculosis Surveillance System from 1994–2006, stratified by age and duration of U.S. residence.

**Results:** Foreign-born children and adolescents accounted for 31% of 17,561 reported TB cases in persons <18 years old from 1994–2006. More than half of these 5,454 cases were from 4 countries: Mexico (34%), Philippines (8%), Somalia (6%), and Vietnam (5%). During this period TB case rates declined 44% among children and adolescents who were foreign-born (from 20.3 to 11.3/100,000) and declined 52% (from 2.1 to 1.0/100,000) among those who were U.S.-born. In 2006, TB case rates for foreign-born children and adolescents residing in the U.S. for less than 2 years were more than 10-fold higher for 1–4 year olds (28.7/100,000) and almost 100-fold higher for adolescents (67.4/100,000) compared to U.S.-born 1–4 year olds (2.1/100,000) and adolescents (0.7/100,000), respectively.

**Conclusions:** Marked disparities in TB morbidity are evident between foreign-born and U.S.-born children and adolescents. High TB case rates in the foreign-born population shortly after U.S. entry suggest that enhanced pre- and post-immigration screening of U.S. entrants <18 years old, particularly adolescents, is needed. Country of origin is an important factor to consider in prioritizing screening.

**Keywords:** tuberculosis, TB, immigrants, children, adolescents, United States

2:35

### Treatment-Related Adverse Events Among Multidrug-Resistant Tuberculosis Patients — Latvia, 2000–2003

**Authors:** Emily Bloss, E. Zarovska, T.H. Holtz, V. Riekstina, S. Kammerer, V. Leimane

**Background:** Annually, approximately thirteen percent of all tuberculosis (TB) patients in Latvia are diagnosed with multidrug-resistant tuberculosis (MDR TB), defined as TB caused by an isolate of *M. tuberculosis* resistant to at least isoniazid and rifampin. MDR TB treatment requires lengthy multi-drug regimens that often cause adverse events.

**Methods:** We retrospectively reviewed treatment management records of patients who began MDR TB treatment between January 1, 2000 and December 31, 2003. Treatment-related adverse events and factors associated with experiencing several ( $\geq 4$ ) adverse events per person in a large MDR TB cohort were evaluated.

**Results:** Among 819 patients, 661 (81%) experienced at least one adverse event, with a median of three per patient (range 1–14). The most commonly reported events were nausea (513, 63%), vomiting (340, 42%), abdominal pain (220, 27%), dizziness (210, 26%), diarrhea (180, 22%) and hearing loss (171, 21%). More serious events such as psychiatric episodes (107, 13%), hepatotoxicity (83, 10%), and renal failure (36, 4%) were also common. 183 (22%) patients experienced a change in drug dose due to an adverse event, while 584 (71%) had at least one drug discontinued temporarily or permanently. Experiencing several adverse events was associated with being female (odds ratio [OR] = 3.4, 95% confidence interval [CI] = 2.0 – 5.7), being older ( $\geq 42$  years) (OR = 3.1, 95% CI = 2.1 – 4.5) or having  $\geq 1$  co-morbid condition (OR = 1.6, 95% CI = 1.1 – 2.3).

**Conclusions:** Both minor and life-threatening adverse events were prevalent among MDR TB patients, with over two-thirds requiring discontinuation of at least one drug. Patients who are female, older, or have co-morbidities should be closely monitored for adverse events.

**Keywords:** tuberculosis, multidrug-resistant tuberculosis, adverse events, Latvia

2:55

### Investigation of an International Traveler with Suspected Extensively Drug-Resistant Tuberculosis — United States, 2007

**Authors:** Ann M. Buff, P. Wiersma, R. Sales, B. DeVoe-Payton, K. Marienau, T. Harrington

**Background:** In May 2007, an asymptomatic traveler with smear-negative, culture-positive, untreated, suspected extensively drug-resistant tuberculosis (XDR TB) on preliminary testing (later confirmed multidrug-resistant [MDR TB]) flew on two international flights. WHO guidelines recommend contact investigations for flights of  $\geq 8$  hours duration for smear- or culture-positive MDR TB patients.

**Methods:** From May to October 2007, we conducted a contact investigation among close contacts, healthcare workers (HCWs), and airline passengers who were U.S. citizens or residents. High-priority passengers sat within two rows of the traveler with TB; others were considered low priority. Tuberculin skin test (TST) results were positive if  $\geq 5$  mm.

**Results:** Among 26 close contacts and 10 HCWs, 24 (92%) close contacts and 9 (90%) HCWs had initial negative TST results. One (4%) close contact had an initial positive TST result; one (4%) close contact and one (10%) HCW had prior latent TB infection (LTBI). There were no new second-round positive TST results among 24 (100%) close contacts or 9 (100%) HCWs. Twenty-five (94%) of 26 high-priority passengers were evaluated. Two (8%) had initial positive TST results; one (4%) had prior LTBI; two (8%) had single negative TST results  $\geq 8$  weeks post-exposure. There were no new second-round positive TST results among 20 (100%) high-priority passengers. Among 246 low-priority passengers, 176 (72%) were tested twice and 7 (4%) had second-round positive TST results; 5 (71%) of 7 were born outside the United States.

**Conclusions:** The relative lack of new positive TST results among close contacts, HCWs, and high-priority passengers indicates that recent *Mycobacterium tuberculosis* transmission was unlikely from this asymptomatic, smear-negative traveler. This investigation underscores the need for improved diagnostic tests for TB.

**Keywords:** pulmonary tuberculosis, *Mycobacterium tuberculosis*, multidrug-resistant tuberculosis, contact tracing, tuberculin test

Thursday, April 17, 2008

### Session P: Alice's Restaurant — Fast Food Ravinia Ballroom 3:30–5:00 p.m.

**Moderator:** Kristin Holt

3:35

### Salmonella Enterica Serotype Newport Outbreak Associated with Mexican-Style Cheese Illinois 2006–2007

**Authors:** Ingrid C. Trevino, C. Austin, L. Saathoff-Huber, M. Bordson, C. Dobbins, C. Gross, K. Marishta, F. Carlson, G. Maurice

**Background:** On October 9, 2006, Kane County Health Department contacted Illinois Department of Public Health to report 13 cases of *Salmonella* serotype Newport (SN) among Hispanics. SN is rare in Kane County, with  $\leq 5$  cases/year from 2001–2005. We investigated to determine the source of infection and to prevent future illness.

**Methods:** A case was defined as diarrhea experienced by a northeastern Illinois resident, with onset March 1, 2006–April 25, 2007, and a pulsed-field gel electrophoresis (PFGE)-matched SN isolate. Food histories were obtained informally from persons to generate hypotheses. Inspections of dairies and Hispanic grocery stores were conducted March 2–April 5, 2007. Persons experiencing onset November 1, 2006–March 2, 2007 and well-neighbor control subjects were interviewed for a matched case-control study.

**Results:** Eighty-five cases were identified, of which 95% reported Hispanic ethnicity. On March 9, 2007, inspectors identified improperly labeled Mexican-style aged cheese (Cotija) at Store A. PFGE-matched SN was isolated from Store A Cotija and from unpasteurized milk from Farm A, which was suspected of illegally selling unpasteurized milk to Store A. In the case-control study, all 12 cases and 27 control subjects reported eating any Mexican-style cheese, but neither Cotija nor Store A was statistically associated with illness. Only three of 85 (3.5%) cases were identified after Farm A ceased unpasteurized milk sales on April 5, 2007.

**Conclusions:** Dairy products made with Farm A unpasteurized milk, including Cotija, were likely responsible for this outbreak. Local and state authorities should enforce unpasteurized milk laws, be alert for improperly labeled dairy products, provide culturally targeted education, and recognize that aged cheese can be a source of infection.

**Keywords:** *Salmonella*, unpasteurized milk, Mexican-style cheese, Hispanic

3:55

### Multistate Investigation of *Escherichia coli* O157:H7 Infections Associated with Frozen Pizza

**Authors:** Jennifer K. MacFarquhar, J. Dunn, D. Swerdlow, K. Jackson, W. Schaffner, S. Stroika, T. Jones

**Background:** *Escherichia coli* O157:H7 (O157) is an important cause of hemorrhagic colitis and hemolytic uremic syndrome (HUS). Recognition of multistate outbreaks has increased, as has the identification of unique sources of infection. We investigated a multistate cluster of O157 cases to identify the vehicle and prevent additional cases.

**Methods:** We defined a case as culture-confirmed O157 infection, demonstrating the outbreak pulsed-field gel electrophoresis (PFGE) pattern with a two enzyme match, occurring during July 20–October 19, 2007. In Tennessee, we performed a 3:1 case-control study, frequency matched on age and geography, using sequential digit-dialing. Fisher's exact 95% confidence intervals (CI) and odds ratios (OR) were computed using SAS®.

**Results:** In Tennessee, eight cases of O157 were identified (median age: 14.5 years; range: 2–65 years). Illness onsets ranged from August 16 to September 19. Five patients were hospitalized; three experienced HUS. Six (75%) case-patients reported having eaten Brand X or Y frozen pizza (manufactured at the same plant), compared with one (4.0%) control subject (OR: 144; CI, 5.8–22,000). Of these, five (63%) had eaten pepperoni-containing pizza (OR: undefined)  $\leq 7$  days before experiencing illness. Overall, 26 PFGE-matched O157 infections were identified in 13 states with onset dates from July 20 to October 19. Median patient age was 8 years (range: 1–65 years). Ten case-patients were hospitalized; four experienced HUS. Of nine non-Tennessee case-patients interviewed, three reported having consumed pepperoni-containing Brand X or Y pizza.

**Conclusions:** This outbreak likely resulted from consumption of pepperoni-containing Brand X and Y pizza. Rapid epidemiologic investigation and prompt multiagency and industry collaboration resulted in voluntary recall of the implicated products, likely preventing additional cases.

**Keywords:** *Escherichia coli* O157, pulsed field gel electrophoresis, diarrhea, outbreak, hemolytic uremic syndrome, frozen foods

4:15

### Misadventures in Microwaving: Multistate Outbreak of *Salmonella* I 4,[5],12:i: — Infections Associated with Commercially Produced Frozen Pot Pies — United States, 2007

**Authors:** Rajal K. Mody, S. Meyer, O. Henao, T. Nguyen, A. Sheth, J. Austin, P. White, I. Williams

**Background:** Nationally, an estimated 45,600 *Salmonella* serotype I 4,[5],12:i: infections occurred in 2006; risk factors are poorly understood. In June 2007, PulseNet, the national foodborne infection molecular subtyping network, identified a *Salmonella* I 4,[5],12:i: outbreak. We investigated to determine the source and prevent illness.

**Methods:** We conducted a matched case-control study, defining a case as a *Salmonella* infection with the outbreak pulsed-field gel electrophoresis pattern in a person  $\geq 2$  years-old with no sick contacts and onset during August 1–October 3, 2007 from selected states. Case-patients were asked about the week before onset; age-group matched controls, selected via reverse directory, were asked about the week before interview. Next, focused questionnaires were requested from patients with outbreak strain infections in 2007.

**Results:** In 2007, 381 persons from 40 states had laboratory-confirmed outbreak strain infections. Forty-eight patients met the study's case definition; 17 case-patients and 24 matched-controls were enrolled. Illness was associated with eating Brand X frozen pot pies (matched OR 23.6, 95% CI 3.8–infinity). Brand X pot pie consumption was reported by 127 (72%) of 176 patients; 75% cooked the pies in microwaves. Although microwaving instructions varied by wattage, 70% of patients could not report their microwave's wattage. Microwaving instructions appeared insufficient to consistently reach appropriate temperatures. Nine Brand X pot pies yielded the outbreak strain. All pot pies produced in the plant, approximately 250 million, were recalled.

**Conclusions:** This largest known salmonellosis outbreak associated with a frozen, microwavable, not-ready-to-eat food adds to evidence that this food category may serve as a foodborne infection vehicle. Poor instructions and limited microwaving knowledge may have increased one's risk. The manufacturer modified Brand X pot pie microwave instructions.

**Keywords:** *Salmonella*, food poisoning, disease outbreak, frozen foods, electrophoresis, gel, pulsed-field

4:35

**Not a Clever Retort: Multistate Outbreak of Botulism Caused by Commercially Canned Hot Dog Chili Sauce — June–August, 2007**

**Authors:** Patricia C. Juliao, S. Bagdure, L. Gaul, L. Granzow, E. Salehi, C. Barton Behravesh, J. Dykes, M. Biggerstaff, M. Lynch, S. Maslanka, C. Olson, I. William, E. Barzilay, and the Multi-agency Investigative Team

**Background:** Foodborne botulism is a rare, sometimes fatal, paralytic illness caused by consuming foods containing botulinum toxin, a neurotoxin produced by the bacterium *Clostridium botulinum*. On July 7 and 11, 2007, public health officials in Texas and Indiana, respectively, reported four cases of botulism to CDC in persons who ate Company X hot dog chili sauce. State and federal officials conducted an investigation to confirm the source and prevent additional illnesses.

**Methods:** Cases were identified through the CDC Botulism Consultation Service and a nationwide public health alert. A case was defined as neurologic illness consistent with botulism in a patient who consumed Company X hot dog chili sauce. State officials obtained patient food histories. CDC and state laboratories tested for botulinum toxin. The Food and Drug Administration (FDA) investigated the canning facility.

**Results:** A total of eight outbreak cases were reported from Indiana (2), Texas (3), and Ohio (3). Botulinum toxin was identified in both Indiana patients' sera, leftovers containing the chili sauce collected from their refrigerator, and leftover chili sauce collected from an Ohio patient's refrigerator. Investigation of the implicated canning facility of Company X identified deficiencies in retort canning permitting survival of *C. botulinum* spores. Company X recalled 39 million cans of hot dog chili sauce and other products manufactured at this facility.

**Conclusion:** Commercially produced hot dog chili sauce caused this first outbreak of foodborne botulism in the United States associated with a commercial canning facility in 34 years. Detection of this outbreak illustrates the importance of centralized reporting of suspect botulism cases. Prompt investigation likely prevented more illnesses. As a result of this outbreak, FDA is investigating U.S. canning facilities.

**Keywords:** botulism, botulinum toxin, botulinum antitoxin, *Clostridium botulinum*, chili sauce

Friday, April 18, 2008

**Session Q: Eye in the Sky — Surveillance Ravinia Ballroom 8:30–10:00 a.m.  
Moderator: Denise Koo**

8:35

**National Surveillance for Carbon Monoxide Poisoning Hospitalizations — United States, 2005**

**Authors:** Shahed Iqbal, A. Stock, F. Yip, P. Garbe

**Background:** Carbon monoxide (CO), a colorless, odorless gas, is the second leading cause of unintentional poisoning deaths with approximately 50,000 emergency department visits each year in the United States. Clinical symptoms of CO poisoning range from flu-like symptoms to long-term neurological complications. Currently, there are no estimates for CO-related hospitalizations because no national data reporting system exists in the US. Hospitalization data are needed to better understand the magnitude, distribution, and severity of CO poisoning. We used the Healthcare Cost and Utilization Project (HCUP) data to generate national estimates of CO-related hospitalizations.

**Methods:** We used the 2005 HCUP National Inpatient Sample (NIS) database, a representative sample of all hospital discharges in the US. The Council of State and Territorial Epidemiologists' definition for CO poisoning was used to categorize cases into confirmed, probable, and suspected types based on the *International Classification of Diseases, Clinical Modification* (ICD-9-CM) codes. We excluded intentional and fire-related CO poisoning cases.

**Results:** In 2005, there were 24,891 hospitalizations with at least one CO-related ICD-9-CM code listed as a diagnosis. Of these, 4,216 (17%) were confirmed cases of CO poisoning. The majority of confirmed cases were males (60%) and  $\geq 45$  years of age (57%). The northeast (23%) and the midwest (31%) regions of the US had higher percentages of confirmed cases. CO poisoning was the principal diagnosis for 7% of confirmed cases; the mean hospital stay for this group was 2.7 days with 75 (4%) fatalities.

**Conclusion:** This study provides the first US estimate of CO-related hospitalizations. The burden of severe CO poisoning is large and can vary regionally. This information is useful in developing prevention messages for this highly preventable environmental illness.

**Keywords:** carbon monoxide, carbon monoxide poisoning, population surveillance, hospitalization, gas poisoning

8:55

### Differing Gonorrhea Rates by Race in Montana — What Is the Role of Incomplete Race Reporting?

**Authors:** Bridget C. Andrew, K. Johnson, L. Kops, S. Helgerson

**Background:** During 2000–2006, rates of *Neisseria gonorrhoeae* (GC) in Montana increased from 7.5 to 20.7/100,000 population. GC rates increased among whites by 481% (from 2 to 11/100,000 populations) and among American Indians/Alaskan Natives (AI/ANs) by 39% (from 46 to 64/100,000). In 2006, AI/ANs accounted for 19% of 197 reported cases of gonorrhea and 6.4% of the total population (944,632) in Montana. Race misclassification in sexually transmitted disease (STD) surveillance data has resulted in underestimates of STD rates among AI/ANs. We investigated the potential role of race reporting on disparities in GC rates by race in Montana.

**Methods:** We analyzed laboratory-confirmed gonorrhea cases reported to the Montana Department of Public Health and Human Services for 2000–2006, by rate, year, race, and reporting source.

**Results:** During 2000–2006, the proportion of all gonorrhea case reports with race unknown declined from 29% of 68 cases to 26% of 197 cases, decreased from 75% to 65% among private-providers, increased from 15% to 33% among STD clinics and remained complete (0%) among Indian Health Service (IHS) facilities. During this time period, the proportion of AI/AN cases reported by IHS declined from 81% to 49%, but the proportion of AI/AN cases reported by private providers and STD clinics increased from 15% to 31% and from 0% to 13% respectively.

**Conclusions:** Among Montana AI/ANs, incomplete race reporting or misclassification, decreased IHS reporting and increased number of AI/ANs GC cases diagnosed at non-IHS sites likely contributed to underestimation of the GC burden and the magnitude of rate increases. Complete race reporting is essential for accurate race-specific rate estimates and effective STD prevention and control in Montana.

**Keywords:** sexually transmitted diseases, gonorrhea, public health surveillance, American Indians, Montana

9:15

### Prevalence of Cervical Cancer Screening Among Human Immunodeficiency Virus (HIV)-Infected Women — Selected U.S. States, 2000–2004

**Authors:** Alexandra M. Oster, P. Sullivan, J. Blair

**Background:** Approximately 250,000 women in the United States are HIV-infected. An estimated 13–60% of these women have cervical cytological abnormalities, which can lead to invasive cervical cancer. HIV treatment guidelines recommend initial and annual Pap tests for all HIV-infected women. We assessed screening prevalence and associated factors among HIV-infected women to determine whether Pap screening is performed as recommended.

**Methods:** We used data collected during 2000–2004 in a cross-sectional interview study of HIV-infected persons aged  $\geq 18$  years in 18 states. Variables included demographic/socioeconomic factors, gynecologic history, HIV care, and use of medical services. We performed logistic regression to compute adjusted odds ratios (AORs) and 95% confidence intervals (CIs) for the association between various factors and not having a Pap test.

**Results:** Among 2,417 women, 556 (23.0%) had not had a Pap test during the past year. Factors associated with not having a Pap test included increasing age (AOR=1.3 per 10 years, CI=1.1–1.4) and most recent CD4 cell count of  $<200$  (AOR=1.6, CI=1.1–2.1) or unknown (AOR=1.4, CI=1.1–1.7). Compared with women whose most recent pelvic exam was performed at their HIV care provider's office, those whose pelvic exam was performed elsewhere had increased odds of not having a Pap test during the past year (AOR=2.6, CI=2.1–3.2). Educational level, household income, drug use, and insurance status were not significantly associated with Pap screening.

**Conclusions:** HIV care providers should ensure that annual Pap tests are performed for women of all ages who have low CD4 cell counts or receive gynecologic care elsewhere. Integrating HIV and gynecologic care and educating clinicians about Pap screening recommendations for HIV-infected women may increase screening among this population.

**Keywords:** HIV infections/complications, mass screening, vaginal smears, uterine cervical dysplasia/diagnosis, uterine cervical neoplasms/diagnosis

9:35

### Moving the Goalposts: Impact of New Definitions of Penicillin Resistance for *Streptococcus pneumoniae*

**Authors:** Meredith Deutscher, J. Jorgensen, B. Beall, A. Glennen, M. Moore for the ABCs Team

**Background:** *Streptococcus pneumoniae* (pneumococcus) is a common cause of meningitis and pneumonia in the U.S. Drug resistance, defined *in vitro* by the minimum inhibitory concentration (MIC) required to inhibit growth, complicates treatment. Drug resistant *S. pneumoniae* (DRSP) is nationally notifiable. Recently, new definitions of penicillin (PEN) resistance for non-meningitis pneumococcal infections were established. We estimated the impact of this change on DRSP reporting.

**Methods:** Cases of invasive pneumococcal disease (IPD) had pneumococcus isolated from normally sterile sites and were residents of 10 Active Bacterial Core surveillance (ABCs) areas during 2005-2006. Susceptible (S), intermediate (I), and resistant (R) isolates had MICs of  $\leq 0.06$ , 0.12-1.0, and  $\geq 2\mu\text{g/mL}$ , respectively, using the old definitions and  $\leq 2$ , 4, and  $\geq 8\mu\text{g/mL}$ , respectively, using the new definitions. Isolates were tested for susceptibility by broth microdilution and categorized as reportable or not according to existing national guidelines (I or R to  $\geq 1$  antibiotic approved for treating IPD).

**Results:** Of 7834 cases of IPD identified during 2005-2006, isolates were available for 6800 (87%) of which 6382 (94%) were from nonmeningitis cases. Using the old PEN definitions, 4817 (75%), 920 (14%), and 645 (10%) of nonmeningitis isolates were S, I, and R, respectively. Using the new definitions, 5990 (94%), 326 (5%), and 66 (1%) of nonmeningitis isolates were S, I, and R, respectively. After classifying all nonmeningitis cases as either reportable or not reportable, use of the new definitions will reduce the proportion of reportable isolates (I or R to any antibiotic) from 36% to 31%.

**Conclusions:** New resistance definitions will cause an artificial decline in DRSP reporting. Health departments should work with clinical microbiology laboratories to ensure that data are interpreted and aggregated correctly.

**Keywords:** *Streptococcus pneumoniae*, surveillance, penicillin, drug resistant

### Friday, April 18, 2008 Session S: One Night in Bangkok — International Presentation of the Paul C. Schnitker International Health Award Ravinia Ballroom 1:30–3:15 p.m. Moderator: Sonja Olsen

1:35

### Impact of Changing Growth Standards on the Prevalence of Acute Malnutrition and Operations of Feeding Programs in Darfur, Sudan (2005–2007)

**Authors:** Christopher Howard, O. Bilukha, L. Talley, M. Brennan

**Background:** Ongoing conflict in Darfur has affected 4.1 million persons and has compromised the nutrition and health status of the overall population. Traditionally, prevalence of global and severe acute malnutrition (GAM/SAM) among children has been measured using the growth standards of the National Center for Health Statistics (NCHS); and admission to feeding programs has been determined by percentage median of weight for height according to NCHS. However, the World Health Organization (WHO) recently published new international growth standards. Conversion to these standards necessitates analyzing its impact on measures of prevalence of acute malnutrition and feeding program operations in Darfur and other nutritional crises.

**Methods:** Anthropometric data on children aged 6-59 months from annual cross-sectional nutrition surveys in Darfur from 2005-2007 were used to compare prevalences of GAM and SAM based upon NCHS and WHO Z-scores. The target numbers of beneficiaries for feeding programs were evaluated by comparing NCHS percent median to WHO Z-scores.

**Results:** For years 2005, 2006, and 2007, the prevalence of GAM based on NCHS Z-scores was 12.0%, 13.0%, and 16.3%, respectively; using WHO Z-scores, the prevalence increased to 14.2%, 15.3%, and 17.2%, respectively. Prevalence of SAM based on NCHS Z-scores were 1.5%, 1.9%, and 1.9%, respectively. Prevalence of SAM using WHO Z-scores increased to 3.0%, 3.2%, and 4.5%, respectively. Using NCHS percent median, SAM for 2007 was 1.1% compared to 4.5% using WHO Z-scores; therefore, we estimated that enrollment for therapeutic feeding would more than quadruple from 7,200 to 29,600.

**Conclusions:** This analysis demonstrates that transition from NCHS to WHO growth standards will have substantial effect on observed prevalence of acute malnutrition, and serious financial and logistic implications for emergency feeding programs.

**Keywords:** acute malnutrition, Darfur, growth standards, therapeutic feeding

1:55

### Improvement in Hand Hygiene Practices Among Healthcare Personnel Following Initiation of an Infection Control Program — Kenya, 2007

**Authors:** Katherine Ellingson, C. Lucero, M. Jhung, M. Katz, P. Patel, C. Ngongo, T. Lye-Maccannell, T. Mwangi, J. Kioli, R. Breiman, M. Bell

**Background:** Adherence to proper hand hygiene practices by healthcare personnel prevents hospital-acquired infections. Yet adherence is low worldwide and particularly challenging in countries lacking infection control infrastructure. In 2007, the Kenyan Ministry of Health and the Centers for Disease Control and Prevention provided a cadre of nurses and doctors with infection control training. During bimonthly workshops and supervisory visits, staff learned to use hand hygiene teaching and auditing tools. We sought to assess changes in, and predictors of, hand hygiene adherence following these trainings.

**Methods:** Between April and October 2007, 24 staff from eight hospitals audited high-risk patient care activities, defined as any form of direct patient contact, on three designated wards. Staff systematically documented hand hygiene opportunities, successes, and resources available. Adherence was calculated by dividing the number of successes by opportunities observed. Predictors of adherence, including audit month and resource availability, were assessed using events-trials logistic regression. Three to six full months of audit data were analyzed from each hospital.

**Results:** Across hospitals, staff completed 243 audits, observing 2113 hand hygiene opportunities. Adherence increased from 28.3% for the first full month of auditing to 59.8% for the last. The odds of adherence increased with each additional month of auditing (aOR=1.27, 95% CI=1.20–1.35). Soap availability at hand washing stations also increased the odds of hand hygiene adherence, (aOR=1.85, 95% CI=1.35–2.55) as did “visible/easy access to hand hygiene stations” (aOR=1.89, 95% CI=1.39–2.55).

**Conclusions:** Hand hygiene adherence improved following initiation of a program to build infection control capacity in Kenyan hospitals. The program’s approach combining centralized training, on-site supervision, and data feedback, may have contributed to improvement. Soap and water availability is crucial.

**Keywords:** infection control, hand washing, hospitals, Africa

2:15

### Fungal in the Jungle — Development and Evaluation of a New Rapid Diagnostic Test for Histoplasmosis — a Wild Opportunity To Improve Survival — Guatemala, 2007

**Authors:** Roque Miramontes, C. Scheel, B. Gomez, B. Samayoa, M. Lindsley, A. Herrera, E. Arathoon, K. Wannemuehler, T. Chiller

**Background:** Histoplasmosis, a serious opportunistic infection in persons with AIDS in Latin America, is associated with poor outcomes. Mortality is high in part because definitive diagnosis depends on culture, which can take weeks, resulting in delays in therapy. We developed a rapid (one-day) urinary antigen ELISA test that can be used to provide rapid diagnosis and treatment and estimate the burden of histoplasmosis.

**Methods:** A prospective observational study was conducted during February 2005 to October 2007 in a large public hospital in Guatemala. Patients enrolled were HIV-infected and had clinically-consistent histoplasmosis. Clinical and laboratory data were collected. Urine at baseline and at intervals throughout follow-up was tested with a new antigen ELISA test for *H. capsulatum*.

**Results:** A total of 181 patients were enrolled in the study; 53 (29%) were diagnosed with histoplasmosis, 41 (24%) with TB, and 10 (19%) were co-infected. The median time from admission to histoplasmosis diagnosis was 15.5 days (1–74). There were 19 (36%) deaths among the 53 histoplasmosis patients. The median time to death was 16 days (1–278). The urinary antigen test had a sensitivity of 84.2%. Predictive value positive was 89%. A urine antigen >2 mcg on admission was associated with death (60% vs. 30%).

**Conclusion:** Mortality is high for AIDS patients with histoplasmosis. Time to diagnosis by traditional means was equal to time to death, demonstrating the need for a rapid test, which could reduce time to treatment. The urine antigen ELISA is a rapid diagnostic test for histoplasmosis with high sensitivity and specificity that could be used in resource-poor settings.

**Keywords:** histoplasmosis, acquired immune deficiency, mortality, co-infection

2:35

### Determinants of Oral Rehydration Therapy Utilization — Asembo District, Kenya, 2007

**Authors:** Christine K. Olson, K. Naik, L. Blum, D. Feikin, R. Breiman, K. Laserson, P. Ram

**Background:** Diarrhea is a leading cause of death in Kenyan children <5 years old. The use of life-saving oral rehydration therapy (ORT) for diarrhea treatment declined by 32% in Kenya from 1998 to 2003. We explored predictors of ORT use among caregivers of children with diarrhea in western Kenya.

**Methods:** In rural Asembo in 2007, we interviewed 375 caregivers of children <5 with diarrhea in the previous two weeks, identified through active surveillance. Community interviewers asked questions regarding knowledge and management of diarrhea. Diarrhea was defined as  $\geq 3$  stools/day. ORT was defined as use of oral rehydration solution (ORS), sugar-salt solution, or increased fluids.

**Results:** The mean age of respondents was 29 years and of children 1.7 years. Most respondents (97%) had heard of ORS; 61% used ORT during the recent illness. Predictors of ORT use included: vomiting (RR=1.3, 95% Confidence Interval [CI] =1.1-1.5), decreased urination (RR 1.2, 95% CI=1.01-1.42), sunken eyes (RR=1.3, 95% CI=1.1-1.6), receiving intravenous fluids (RR=1.4, 95% CI=1.2-1.7), and receiving oral medications (RR=1.5, 95% CI=1.2-1.9). Care-seeking at a health facility (RR=1.8, 95% CI=1.5-2.1), believing a child could die from diarrhea (RR=1.3, 95% CI=1.1-1.6), knowing where to obtain treatment (RR=1.5, 95% CI=1.1-2.2), and knowing how to prepare ORS (RR=1.6, 95% CI =1.1-2.3) were associated with ORT use. Perceived affordability of ORS, child's age, and maximum number of stools were not associated with ORT utilization.

**Conclusions:** Predictors of ORT utilization included symptoms of disease severity and care-seeking at health facilities, suggesting a delay in administration of ORT until dehydration is obvious. Effective health communication is needed to encourage ORT use as soon as possible after the onset of diarrhea to prevent dehydration.

**Keywords:** oral rehydration solution, oral rehydration therapy, diarrhea, childhood, Kenya

2:55

### Evaluation of Active Population-Based Surveillance for Pneumonia — Thailand, 2007

**Authors:** Oliver Morgan, D. Areechokchai, H. Baggett, S. Thamthitawat, P. Prapasiri, S. Chunsutiwat, K. Ungchusak, R. Prasarnthong, S. Henchaichon, S. Naorat, A. Fleischauer, S.J. Olsen, S. Maloney

**Background:** In Thailand, pneumonia is the leading cause of death from infectious disease. In 2002, active population-based surveillance was implemented to determine the incidence of hospitalized pneumonia. Evaluation of this surveillance system is critical to determine its accuracy and usefulness to inform public health policy decisions.

**Methods:** The surveillance system included all 20 hospitals in Sa Kaeo and Nakhon Phanom provinces (population 1.2 million). Staff reviewed inpatient logs daily for any of 59 admission diagnoses indicative of pneumonia; clinical pneumonia was defined as evidence of acute infection and signs or symptoms of respiratory illness. Sensitivity, specificity and positive predictive value of the admission diagnoses were calculated by comparing a one-month sample of all inpatient medical charts. Incidence from the active system was compared with reports from the national passive pneumonia surveillance system.

**Results:** In 2006, 12,203 clinical pneumonia patients were identified by active surveillance (incidence 1,017/100,000). Sensitivity and specificity were 95% and 99%, respectively, and positive predictive value was 67%; 11,026 (90%) pneumonia patients were identified through 17 admission diagnoses. Monthly pneumonia incidence was 3 and 6 times higher than incidence calculated from national passive surveillance in Nakhon Phanom and Sa Kaeo, respectively. Both systems identified disease peaks in March and July/August and highest age-specific incidence among children <5 and adults  $\geq 60$  years. The major strength of the active system was accurate incidence estimation using a standard case definition. Primary limitations included human resource requirements (20 surveillance officers) and relatively high operating costs (~\$300,000 annually).

**Conclusions:** Although relatively resource intensive, active population-based surveillance in Thailand provides high quality data needed to define pneumonia disease burden, evaluate impact of interventions, and better prioritize prevention measures.

**Keywords:** pneumonia, surveillance, population-based, evaluation

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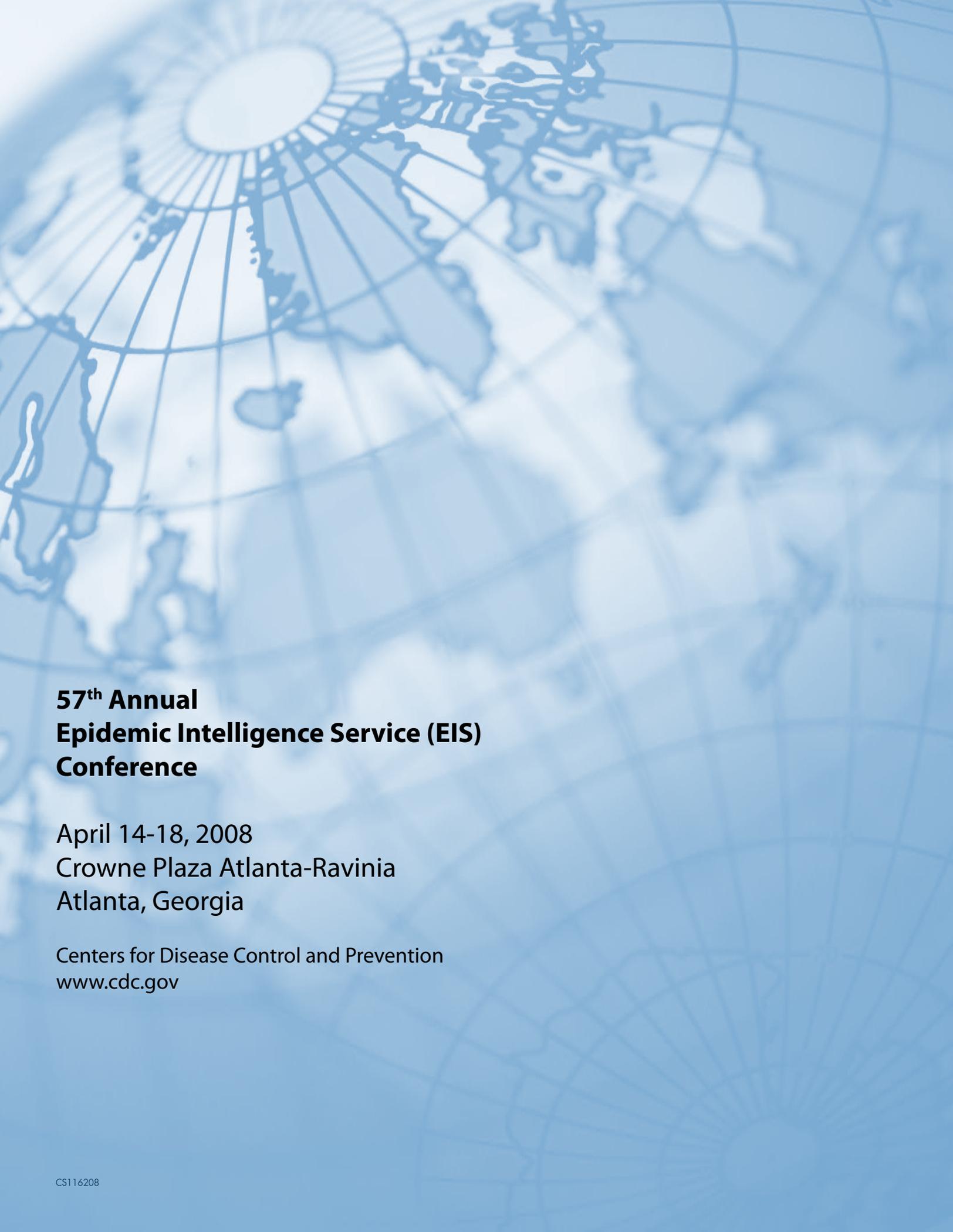
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**57<sup>th</sup> Annual  
Epidemic Intelligence Service (EIS)  
Conference**

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