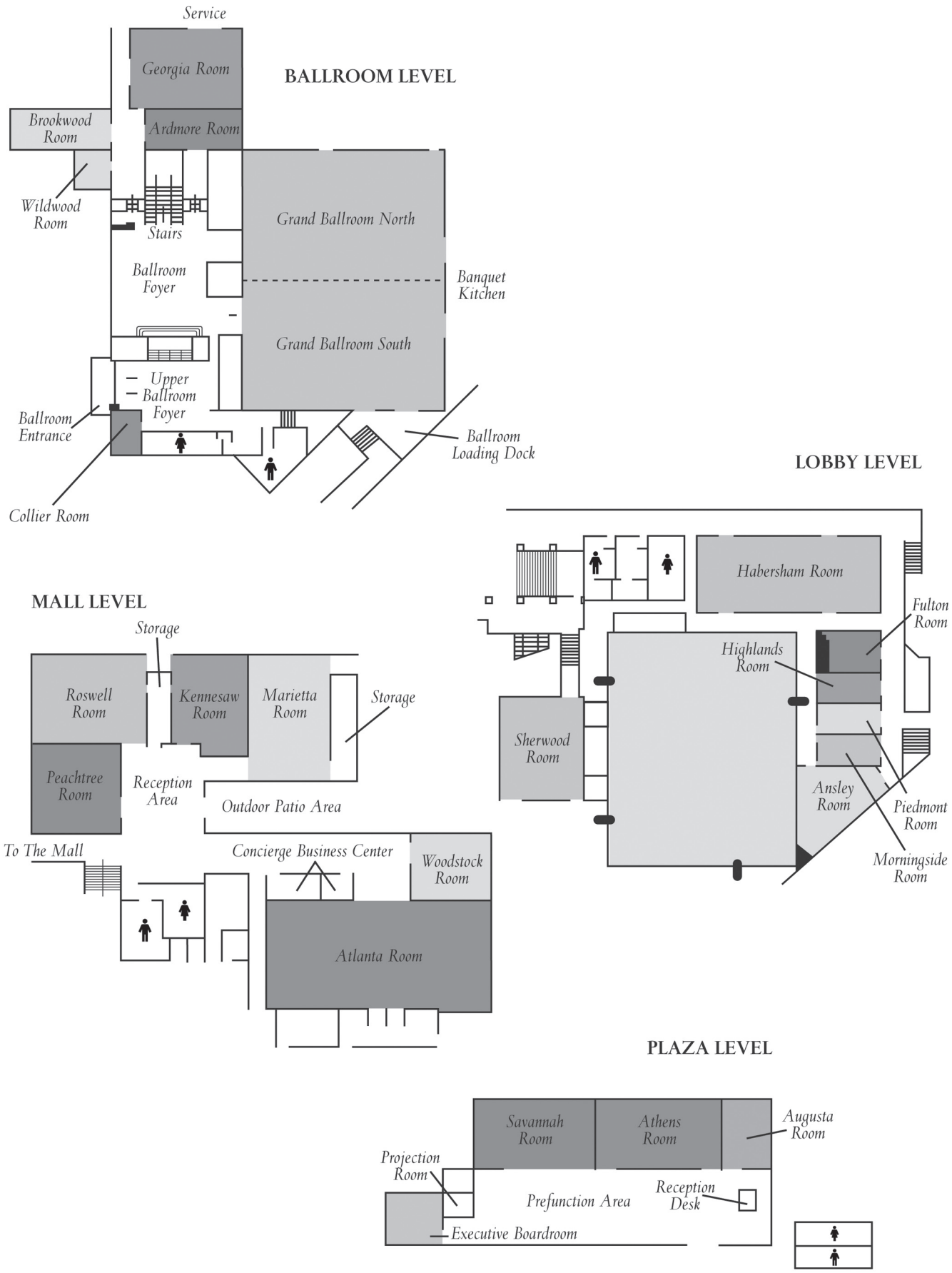
55th Annual Epidemic Intelligence Service Conference

April 24–28, 2006
Sheraton Midtown Hotel
Atlanta, Georgia

TM

U.S. Department of Health and Human Services

SHERATON COLONY SQUARE HOTEL



55th Annual Epidemic Intelligence Service (EIS) Conference

April 24-28, 2006

Centers for Disease Control and Prevention • Atlanta, Georgia

Contents

Preface 3
Program Committee 4
General Information 5
Conference Program Schedule 6-18
Presenting EIS Officers, by National Center 19
Overview of Awards and Prize Manuscripts 20
Alexander D. Langmuir Lectures, 1972–2005 21
Alexander D. Langmuir Prize Manuscripts, 1966–2005 22-25
Awards Presented at 2005 Conference 26
Award Committee Members 27
Continuing Education Credits 28-29
Incoming EIS Class 30
Abstracts 31-96
Index to Presenters ..... Inside Back Cover

MARK YOUR CALENDARS!

56th Annual
Epidemic Intelligence Service (EIS)
Conference

April 16-20, 2007
Centers for Disease Control and Prevention
Atlanta, Georgia

Dear Friends of EIS,

Welcome to the 55th Annual Epidemic Intelligence Service Conference. We are delighted that you are able to attend our annual conference, which highlights the professional activities of EIS Officers. The scientific program this year includes 95 oral presentations and 31 poster presentations. In addition, your experience this week will be enriched by International Night, the EIS skit, the Prediction Run, special award presentations, and other activities that have long been a tradition at the EIS Conference.

In reading last year's note, I see that I referred to 2004 as "The Year of the Flood" and spoke about the tsunami in South East Asia and the multiple hurricanes that had battered Florida and the Caribbean. Little did I realize that last year's hurricane season was merely a warm-up for Katrina and Rita. As you would expect, EIS Officers figured prominently in all aspects of CDC's response to these amazing natural disasters. Officers deployed to the disaster sites helped establish surveillance for injuries and illness in the affected areas, conducted needs assessments among displaced persons, investigated disease outbreaks, and temporarily replaced local public health workers forced by the storms to evacuate. As an added bonus to their training experience, the current cohort of EIS Officers often worked closely with the military in the affected areas, and consequently, they became much more familiar than previous EIS Officers with when, where, and how to salute. This was especially true for the EIS Officers billeted on the Marine Corps amphibious landing ship, Iwo Jima, anchored just offshore from New Orleans. During the 6 weeks after Katrina's landfall, EIS Officers participated in 105 field deployments and another 18 assignments to the CDC Director's Emergency Operations Center.

Speaking of the new officers, we extend a special welcome to the incoming members of the EIS Class of 2006. The incoming officers are a select group of men and women with a broad array of interests and skills. Fifty-two (63%) of the new officers are women, and 11 (13%) are citizens of other nations. The countries represented this year are Armenia, the Bahamas, Belgium, Brazil, China, Germany, Great Britain, Italy, and Uzbekistan. Among the 71 who are U.S. citizens, 21 (30%) represent racial and ethnic minority groups. The class includes 39 physicians, 24 doctoral-level scientists, 12 veterinarians, four nurses, one physician assistant, one naturopath, and one MD/DVM.

This year, we will again be running concurrent oral sessions on Tuesday and Wednesday mornings, so please check your program carefully. Several special sessions are also scheduled for this year's conference. At lunchtime on Tuesday, a session featuring "Disasters and Chronic Diseases" will be held, and again at lunchtime on Thursday, a special session will focus on "Pandemic Flu Preparedness."

This 2006 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 throughout these events.

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

2006 EIS Conference

Scientific Program Committee

Jennita Reefhuis, National Center on Birth Defects and Developmental Disabilities, Chair
Kate Brett, National Center for Health Statistics, Co-Chair
Mick Ballesteros, National Center for Injury Prevention and Control
Bruce Bernard, National Institute for Occupational Safety and Health
Janet Blair, Office of Workforce and Career Development
Jill Ferdinands, National Center for Environmental Health
Susan Goldstein, National Center for Infectious Diseases
Kashef Ijaz, National Center for HIV, STD, and TB Prevention
Jim Lando, National Center for Chronic Disease Prevention and Health Promotion
Pekka Nuorti, National Immunization Program
Cynthia Ogden, National Center for Health Statistics
Jenny Williams, National Center on Birth Defects and Developmental Disabilities

Latebreaker Session Committee

Kasher Ijaz, National Center for HIV, STD, and TB Prevention, Chair
Janet Blair, Office of Workforce and Career Development
Jim Lando, National Center for Chronic Disease Prevention and Health Promotion

Program Production

Doug Hamilton, EIS Program
Dan Higgins, Creative Services
Erica R. Lowe, EIS Program
Lisa N. Pealer, EIS Program
Kay Smith-Akin, OWCD Science Office
Jim Walters, Creative Services
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 2006 EIS Conference.

Color Key for 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

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.

PURPOSE STATEMENT

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

OVERALL CONFERENCE GOALS

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

REGISTRATION AND INFORMATION

Staff will be available at the conference registration desk located in front of the Grand Ballroom on the Ballroom level of the hotel. Check-in and 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 Georgia 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 Wildwood 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 Ballroom Foyer. Check out what's going on at each of CDC's National Centers when you stop by their information tables.

Monday, April 24, 2006

7:30 Registration Desk Opens

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

8:30 Session A: Ever-Interesting Stories: Opening Session .....Grand Ballroom
Moderators: Julie L. Gerberding and Stephen B. Thacker

8:35 Large Outbreak of Cryptosporidiosis Associated with a Recreational Water Spraypark—New York, 2005. *Joshua Schaffzin*

8:55 Investigation of Carbon Monoxide Poisonings After Hurricane Katrina—Alabama, 2005. *Deidre Crocker*

9:15 Evidence-Based Approach To Improving Tuberculosis Screening Among Persons with HIV Infection—Cambodia, 2005. *Kevin Cain*

9:35 National Estimates of Intimate Partner Violence from the Behavioral Risk Factor Surveillance System—17 U.S. States and Territories, 2005. *Matthew Breiding*

9:55 Investigation of the Largest Measles Outbreak in the United States in a Decade—Indiana, 2005: Implications for Sustaining Measles Elimination. *Amy Parker*

10:15 BREAK

10:45 Session B: Cause I'm a Woman: Women's Health.....Grand Ballroom
Moderator: Yvonne Green

10:50 Periconceptional Intake of Vitamins Containing Folic Acid and Risk for Multiple Congenital Anomalies—Iowa, 1993–1995. *Rebecca Bitsko*

11:10 Human Papillomavirus Prevalence and Incidence Among Girls Attending an Adolescent Innercity Clinic—Atlanta, Georgia, 1999–2004. *Thu-Ha Dinh*

11:30 Trends in Gestational Diabetes and Pregnancy-Related Hypertension Among Women— Los Angeles County, 1991–2003. *Elizabeth Baraban*

11:50 Responding to the Changing Epidemiology of Syphilis: Exploratory Interviews of Women with Early Syphilis—Chicago, Illinois, 2005. *Heather Lindstrom*

12:15 LUNCH

12:30 Public Health Veterinarians Meeting .....Habersham Room

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

Monday, April 24, 2006 (Continued)

Poster Session: Oh No, There I Go Again: Diarrheal Illness

P1. Oops...It Happened Again: Periodic Trends in *Shigella sonnei* Outbreaks Among Children Aged 0–9 Years. *Ezra Barzilay*

P2. Outbreak of *Escherichia coli* O157:H7 Related to Direct and Indirect Animal Contact in Petting Zoos—Florida, 2005. *Daniel Chertow*

P3. Epidemiologic and Laboratory Surveillance for Bacterial and Rotavirus Diarrhea Among Rural Western Kenya Children, 2005. *Ciara O'Reilly*

P4. Increasing Rates of *Clostridium difficile*-Associated Disease in Hospitals—New Jersey, 2000–2004. *Esther Tan*

P5. Risk Factors for Bacterial Diarrhea Among Persons with HIV Infection—United States, 1992–2003. *Andrew Voetsch*

P6. Surveillance for Visitor Behavioral Risk Factors and Enteric Pathogen Shedding by Animals—South Carolina State Fair Petting Zoo, 2005. *Mary Anne Wenck*

Poster Session: Dangerous Dining: Foodborne Illness

P7. Multistate Outbreak of *Salmonella* Typhimurium Infections Associated with Inadequately Treated Orange Juice—United States, 2005. *Seema Jain*

P8. Multistate Outbreak of *Salmonella* Typhimurium Infections Associated with Eating Ground Beef—United States, 2004. *Neely Kazerouni*

P9. Is It the Melon? Outbreak of *Escherichia coli* O157:H7 Associated with Multiple Events Served by One Caterer—Ohio, August–September 2005. *Manoj Menon*

P10. Outbreak of *Shigella flexneri* Serotype 2a at a Golf Tournament—Maine, 2005. *Araceli Rey*

Doctor, Heal Thine Tools: Nosocomial Infection

P11. *Aspergillus*-Associated Outbreak of Prosthetic Valve Endocarditis—Colorado, 2005. *Lauren Burwell*

P12. Outbreak of Human Adenovirus 3 Infection in a Pediatric Chronic-Care Facility—IIlinois, 2005. *Lyn James*

P13. Outbreak of *Rhizopus arrhizus* Associated with Ileostomy Care After Abdominal Surgery—Ohio, 2005. *Mysheika LeMaile-Williams*

P14. Outbreak of Systemic Inflammatory Response Syndrome Linked to a Compounding Pharmacy—Virginia, 2005. *Ami Patel*

P15. It's in the Bag: A Multistate Outbreak of *Serratia marcescens* Bloodstream Infection Associated with Contaminated Intravenous Magnesium Sulfate from a Compounding. *Rebecca Sunenshine*

Monday, April 24, 2006 (Continued)

1:30 Session C: Swim, Don't Swallow: Waterborne Disease .....Grand Ballroom
Moderator: Michael Beach

1:35 Outbreak of Leptospirosis Among Adventure Race Participants—Tampa, Florida, 2005. *Eric Stern*

1:55 Two Fatal Cases of Primary Amebic Meningoencephalitis—Oklahoma, August 2005. *Sara Russell*

2:15 Fountain of Fever: An Unexpected Source in a Community Outbreak of Legionnaires' Disease—South Dakota, 2005. *Rosalyn O'Loughlin*

2:35 Outbreak of Norovirus Gastroenteritis Among River Rafters—Grand Canyon, 2005. *Mark Malek*

3:00 BREAK

3:15 Session D: Workin' Hard For The Money: Occupational Illness and Injury .....Grand Ballroom
Moderator: Donald Millar

3:20 There's a Fungus Among Us: Knowledge, Attitudes, and Practices of Residents and Remediation Workers Regarding Mold—New Orleans, Louisiana, October 2005. *Kristin Cummings*

3:40 Evaluation of a System for Surveillance for Pneumonia Among Health-Care Workers— Maryland, 2005. *Gita Mirchandani*

4:00 Outbreak of Building-Related Symptoms—Wisconsin, 2005. *Arthur Wendel*

4:20 Cluster of Rash Illness Among Construction Workers After Hurricane Rita—Louisiana, 2005. *Hannah Gould*

4:40 Risk for Tuberculosis Among Staff at a Nairobi Hospital: The Price of Serving the Community—Kenya, 2005. *Shona Dalal*

5:00 Roofers: At Risk for Silicosis—Arizona, 2005. *Judith Eisenberg*

5:30 EIS Social (Cash-Bar) ..... Crowne Room

Tuesday, April 25, 2006

8:30 Concurrent Session E1: What? You're Still Sick?: Chronic Disease .....Grand Ballroom
Moderator: Janet Collins

8:35 Weight-Loss Attempts Among Obese Adults—United States, 1999–2002. *Carolyn Tabak*

8:55 Disparities Among Persons with Diabetes-Related Amputations Along the Texas-Mexico Border—2003. *Eric Miller*

Tuesday, April 25, 2006 (Continued)

9:15 Mobility Limitation and Peripheral Arterial Disease (PAD)—United States, 1999–2002. *Min Tao*

9:35 Oral Cancer Incidence and Survival—Washington, DC, 1997–2002. *Sukhminder Sandhu*

9:55 Rapid Assessment of Health Needs and Resettlement Plans Among Hurricane Katrina Evacuees—San Antonio, Texas, 2005. *Parmi Suchdev*

8:30 Concurrent Session E2: TB Or Not TB? That Is The Question: Tuberculosis ..... Habersham Room
Moderator: Kenneth G. Castro

8:35 Uninterrupted *Mycobacterium tuberculosis* Transmission in a Rural Community—Indiana, 1999–2005. *Michele Hlavsa*

8:55 Tuberculosis Outbreak Investigation in a Crack House Reveals Limited Use of Traditional Contact Investigation Methods—Miami, 2004–2005. *Rana Jawad Asghar*

9:15 Retrospective Cohort Study of the Impact of Surgery on Treatment Outcomes Among Multidrug-Resistant Tuberculosis Patients—Latvia, 1997–2002. *Kevin Cain*

9:35 Extensive Drug-Resistant Tuberculosis: Global Survey of Supranational Reference Laboratories for *Mycobacterium tuberculosis* with Extensive Resistance to Second-Line Drugs. *Sarita Shah*

9:55 Evaluation of Access to and Acceptance of HIV Testing Among Patients with Tuberculosis—Rwanda, 2005. *Eric Pevzner*

10:15 BREAK

10:45 Concurrent Session F1: Sharing the Love: Sexually Transmitted Disease ..... Grand Ballroom
Moderator: Stuart Berman

10:50 Primary and Secondary Syphilis Incidence Trends Among a Cohort of Patients Infected with Human Immunodeficiency Virus—United States, 1998–2003. *Dina Hooshyar*

11:10 “Safe Sex” or No Sex: What U.S. Clinicians Are Saying to Adolescents About How To Prevent Sexually Transmitted Diseases—Results from a National Survey, 2004. *Zsakeba Henderson*

11:30 Rising Rate of Gonorrhea Among Heterosexuals—San Francisco, 2005. *Pennan Barry*

11:50 Increasing Incidence of Gonorrhea—Utah, 1999–2004. *Juliana Grant*

Tuesday, April 25, 2006 (Continued)

10:45 Concurrent Session F2: No Warrant Needed: Surveillance ..... Habersham Room
Moderator: Adolfo Correa

10:50 Sporadic Mycobacteria Infections Associated with Nail Salons—California, 2003–2005. *Jean Yuan*

11:10 Completeness and Timeliness of Laboratory Reporting for Notifiable Diseases: A Comparison of Paper and Electronic Reporting—New York City, 2005. *Trang Nguyen*

11:30 Allograft-Associated Infections: Reports to the Food and Drug Administration's MedWatch Program—United States, 2001–2004. *Su Wang*

11:50 Some Like it "Hot": Rapid Identification of Wild Poliovirus Transmission by Acute Flaccid Paralysis Surveillance—India, 2004. *Sucheta Doshi*

12:15 LUNCH

12:30 Special Session: Disasters and Chronic Diseases ..... Habersham Room
Moderator: Janet Collins

12:30 Monday–Friday Poster Session. Posters on Display in the Grand Ballroom. All posters presented during the conference will be on display Monday, 9:00 a.m. - Friday, 12:00 p.m.

1:45 Session G: Cat5 Is Not a Zoonosis: Hurricane-Associated Disease and Injury ..... Grand Ballroom
Moderator: Raoult Ratard and Thomas Sinks

1:50 Carbon Monoxide Poisoning from Hurricane-Associated Use of Portable Gasoline-Powered Generators—Florida, 2004. *David Van Sickle*

2:10 Disasters, Drugs, and Disease: Health-Care Encounters and Medication Use Among Evacuees of Hurricane Katrina—San Antonio, Texas, 2005. *Michael Jhung*

2:30 Rapid Assessment of Newborn Screening in Louisiana After Hurricane Katrina, 2005. *Emad Yanni*

2:50 Mental Health Outcomes in the New Orleans Police Force After Hurricane Katrina—New Orleans, Louisiana, 2005. *Christine West*

3:10 This Mold House: Exposure Assessment of Flood-Damaged Homes—New Orleans, Louisiana, October 2005. *Margaret Riggs*

3:30 Rapid Health Needs Assessment Among Hurricane Katrina Evacuees—Arkansas, 2005. *Fuyuen Yip*

4:00 BREAK

6:00 Prediction Run ..... Piedmont Park
14th Street Entrance

Wednesday, April 26, 2006

8:30 Concurrent Session H1: The Abacus Is So Passé: Peavy Finalists.....Grand Ballroom
Moderator: David Sencer

8:35 Excess Heat-Related Mortality—Phoenix Area (Maricopa County), Arizona, 2000–2005. *Fuyuen Yip*

8:55 Depressive Symptoms Among Firefighters in New Orleans After Response to Hurricane Katrina—Louisiana, 2005. *SangWoo Tak*

9:15 Positive Association Between Pregnancy Weight Gain and Childhood Overweight Is Strongest Among Underweight Mothers—United States,1996–2003. *Andrea Sharma*

9:35 Adverse Reactions After Permanent Make-Up Procedures—United States, 2004–2005. *Masja Straetemans*

9:55 Fetal Loss Among Pregnancies Conceived Through Assisted Reproductive Technology—United States, 1999–2002. *Sherry Farr*

8:30 Concurrent Session H2: Now This Won't Hurt A Bit: Vaccine Preventable Disease.....Habersham Room
Moderator: Melinda Wharton
Presentation of the Iain C. Hardy Award

8:35 Nothing To Cough at: A Statewide Epidemic of Pertussis—Wisconsin, 2004. *Alexandra Newman*

8:55 Invasive Pneumococcal Disease Among HIV-Infected Adults: Impact of Pneumococcal Vaccination and Highly Active Antiretroviral Therapy. *Christina Phares*

9:15 Measles Outbreak in South Africa, 2003–2005. *Meredith McMorrow*

9:35 Reduction in Hepatitis B Virus Seroprevalence Among U.S.-Born Children of Asian Immigrants—Georgia, 2001–2004. *Carrie Shuler*

9:55 Reemerging Pertussis and the Adult Factor—Colorado, 2004. *Tista Ghosh*

10:15 BREAK

10:30 Concurrent Session I1: Give Kids a Chance: Child & Adolescent Health.....Grand Ballroom
Moderator: Robin Ikeda

10:35 Methamphetamine Use Is Independently Associated with Risky Sexual Behaviors and Adolescent Pregnancy. *Lauren Zapata*

10:55 Outpatient Pediatric Adverse Drug Events: Results from a National Surveillance System, 2004. *Adam Cohen*

11:15 Health-Seeking Behavior for Respiratory Illness Among Young Children in a Rural African Setting—Kenya, 2005. *Deron Burton*

11:35 Evaluation of Student-Run Suicide Prevention Awareness Campaigns in Schools—Washington, 2004. *Jonathan Siekmann*

Wednesday, April 26, 2006 (Continued)

10:30 Concurrent Session I2: Resistance is Futile: Drug-Resistant Infection ..... Habersham Room
Moderators: Chris Van Beneden and Daniel B. Jernigan

10:35 New Prospectives for Control of Multidrug-Resistant *Shigella sonnei* Infection Among Pediatric Populations—Kentucky, 2005. *Nato Tarkhashvili*

10:55 Emergence of Sulfonamide-Resistant *Nocardia* Infections—Alabama, 2000–2004. *Kristin Uhde*

11:15 Perinatal Sepsis Caused by *Staphylococcus aureus*—Soweto, South Africa, 2004. *Roopal Patel*

11:35 Antimicrobial Resistance Pattern of *Shigella sonnei*—Kansas, 1997–2004. *Angela Huang*

11:55 When Good Drugs Don't Work: The Role of Macrolide Resistance In Breakthrough Pneumococcal Bacteremia—United States, 2001-2003. *Gavin Grant*

12:15 LUNCH

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

Poster Session: Seahat, Gezondheid, Tena, Santé, Jian Kang, Sohha,Zdorovya, Salud, Janmrteloba: International Health

P16. Use of Classification and Regression Tree (CART) Analysis To Develop a Diagnostic Decision Tree To Detect Tuberculosis Among Sputum Smear-Negative HIV-Infected Persons—Botswana. *Sekai Chideya*

P17. Early Clinical Toxicity to Highly Active Antiretroviral Therapy in a Home-Based AIDS Care Program in Rural Uganda. *Fatu Forna*

P18. Hospital Utilization for Pneumonia in Rural Thailand. *Hannah Jordan*

P19. Who Gets Influenza Pneumonia in Thailand? *Mark Katz*

P20. Famine or No Famine? —Niger, 2005. *Avid Reza*

P21. Distribution of Free Bed Nets Bundled with Insecticide Through an Integrated Child Health Campaign—Lindi Region of the United Republic of Tanzania, 2005. *Jacek Skarbinski*

Poster Session: What's Your Vector, Victor?: Animal-Associated Disease Vectors

P22. Emergency Department-Based Syndromic Surveillance System for Meningitis and Encephalitis—Maricopa County, Arizona, 2004. *Nelson Arboleda*

P23. Outbreak of Q Fever at a Horse-Boarding Ranch with a Goat Herd—Pueblo County, Colorado, 2005. *Wendy Bamberg*

Wednesday, April 26, 2006 (Continued)

P24. Epidemiology of Human Rabies in the United States, 1997–2004. *Alice Chapman*

P25. Controlling a Malaria Outbreak in a Tourist Resort Area in the Dominican Republic. *James Eliades*

Poster Session: Infection Collection: Infectious Disease

P26. Disparities in Testing Practices for *Coccidioides* Among Patients with Community-Acquired Pneumonia—Metropolitan Phoenix, 2003–2004. *Douglas Chang*

P27. Ascertainment of Risk for Polio Infection Among Iowa's Amish Community Members, 2005. *Luca Flamigni*

P28. Outbreak of Pertussis in an Amish Community—Kent County, Delaware, October 2004–February 2005. *Kathy Kudish*

P29. Risk Factors for *Helicobacter pylori* in a Rural Community—Montana, 2005. *Elizabeth Melius*

P30. Imported Measles in a New Hampshire Resident—2005. *Rachel Plotinsky*

P31. Changing Prevalence of Intestinal Parasites Among Newly Arrived Southeast Asian and African Refugees After Empiric Predeparture Albendazole Treatment—Minnesota, 1993–2004. *Stephen Swanson*

1:30 Session J: It's Not Just a Cold: Influenza .....Grand Ballroom
Moderator: Ray Strikas

1:35 Persistent Circulation of Highly Pathogenic Influenza—Hawaii, 1918–1920. *Kate Gaynor*

1:55 Screening and Isolation of Suspected Highly Communicable Diseases in Emergency Departments—New York City, 2005. *Benjamin Tsoi*

2:15 Influenza Vaccine Effectiveness Against Laboratory-Confirmed Influenza Among Children Aged 6–59 Months—Georgia, 2003–2004. *Carrie Shuler*

2:35 Survey of State Practices During the Influenza Vaccine Shortage of 2004–2005. *Tom Shimabukuro*

2:55 Correlates of Not Receiving Influenza Vaccination Among Health-Care Personnel—United States, 2004–2005. *Suchita Lorick*

3:15 Mass Distribution of Intranasal Influenza Vaccine in a Public School System—Tennessee, 2005. *Lawrence Carpenter*

Wednesday, April 26, 2006 (Continued)

3:45 BREAK

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

Announcement of Distinguished Friend of the EIS Award
Presented by EIS Alumni Association

Speaker: Professor Brian Greenwood
London School of Hygiene and Tropical Medicine

Topic: Measuring Malaria

5:30 EIS Alumni Association Meeting ..... Atlanta Room

7:30 Session L: Field Epidemiology: Putting Science into Practice Around the World: International Night .....Habersham Room
Moderator: Jeffrey P. Koplan and Roberto Antonio Flores Reuna

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

7:35 Paralytic Shellfish Poisoning Outbreak—Corinto, Nicaragua, November 2005. *Ana C. Meléndez Darce*

7:55 Coliform Outbreak in a Southeastern Island in Luzon–Philippines, 2005. *Rosario P. Pamintuan*

8:15 High-Level Beta-Hexachlorocyclohexane Contamination in Dairy Farms–Sacco River Valley, Latium, Italy, 2005. *Marcello Sala*

8:35 Outbreak of Cholera in a Refugee Camp in Kenya—May 2005. *Jared O. Omolo*

8:55 Paratyphoid Fever in the United States: An Underestimated Disease. *Sundeep Gupta*

9:15 A Prison Based Foodborne Outbreak of Gastroenteritis Involving Several Pathogens—Spain, 2005. *Victoria Hernando*

International Night Poster Session:

P1. Schistosomiasis Infection among School Children in the Zhaugwe Resettlement Area, Zimbabwe, April 2005. *Daniel Chirundu*

P2. Hypersensitivity-Type Reactions in Young Children following Administration of Measles-Mumps-Rubella Vaccine during a National Campaign—Brazil, 2004. *Daniel Freitas*

P3. European Migrants More Likely to be Diagnosed with Tuberculosis a Decade After Arrival in Australia – Victoria 1990-2004. *Michelle McPherson*

Wednesday, April 26, 2006 (Continued)

P4. Efficacy of Nevirapine in Reducing Mother to Child Transmission of HIV in Murehwa District, 2005. *Auxilia Muchedzi*

P5. Cholera Outbreak Among Patients in a Mental Health Institution – Philippines 2004... Pabellon. *Joy Althea L Pabellon*

P6. Foodborne Disease Outbreak Among Employees of a Government Office – Metro Manila, Philippines, 2004. *Julia Racquel Rimando-Magalong*

P7. Dolce Vita, Dolce Aria: Cross-sectional Surveys of the Effects of a Generalized Ban on Smoking in Enclosed Public Spaces, Italy, 2005. *Salvatore Scondotto*

P8. The Largest *Neisseria meningitides* serogroup A Outbreak in the Philippines, 2004 – 2005. *Genesis May J. Samonte*

P9. Iron Supplementation Reduces Anemia and Improves Performance Among Adolescent Tribal Girls in Central India. *Tapas Chakma*

P10. Surveillance and Risk Factors for Yunnan Sudden Unexpected Cardiac Death, China, 2005. *Xie Xu*

9:35 Presentation of William H. Foege Award .....Habersham Room
Closing Remarks
Reception

Thursday, April 27, 2006

8:30 Session M: Eureka! I've Found It: Mackel Award Finalists .....Grand Ballroom
Moderator: Rima F. Khabbaz and Michael McGeehin

8:35 *Ralstonia* Contamination of Neonatal Oxygen Delivery Device—United States, 2005. *Michael Jhung*

8:55 Multistate Outbreak of *Escherichia coli* O157:H7 Infections Associated with Prepackaged Lettuce Salad Advertised as "Ready-To-Eat," 2005. *Stephen Swanson*

9:15 Lymphocytic Choriomeningitis Among Organ Transplant Recipients from a Pet Hamster—Massachusetts/Rhode Island, 2005. *Boris I. Pavlin*

9:35 Multicounty *Salmonella enteritidis* Outbreak Caused by Tomatoes: Rapid Detection of Cases by Using Multiple-Locus, Variable-Number Tandem Repeat Analysis. *Jean Yuan*

9:55 Delayed Onset *Pseudomonas fluorescens* Group Bloodstream Infections After Exposure to Contaminated Heparin Flush—Michigan and South Dakota, 2005. *Mark Gershman*

10:15 BREAK

Thursday, April 27, 2006 (Continued)

10:30 Session N: Why Can't We All Just Get Along?: Illness Associated with Mass Gatherings.....Grand Ballroom
Moderator: Robert Tauxe

10:35 Surveillance at an Outdoor Mass Gathering—Virginia, 2005. *Elizabeth Melius*

10:55 Norovirus Outbreak After a Vomiting Episode in a Hotel—Omaha, Nebraska, 2005. *Anand Date*

11:15 A Walk in the Woods: Injury and Violence Surveillance at the Annual Gathering of the Rainbow Family of Living Light—West Virginia, 2005. *Robert Bossarte*

11:35 Oropharyngeal Carriage of *Neisseria meningitides* Serogroup Y During an Outbreak at a Residential Training Facility—Utah, 2005. *Diane Gross*

10:30 Preventive Medicine Residency Information Dissemination .....Roswell Room

12:00 LUNCH

12:30 Special Session: Pandemic Flu Preparedness .....Habersham Room
Moderators: Joe Bresse and Ray Strikas

1:30 Preventive Medicine Residency Information Dissemination .....Roswell Room

1:30 Session O: As Easy as Falling Off a Ladder: Injury.....Grand Ballroom
Moderator: Ileana Arias

1:35 Unintentional Motor-Vehicle–Train Collisions—Oklahoma, 1995–2003. *Sara Russell*

1:55 Identifying Predictors of Suicide Attempts Among Adolescents—Oregon, 2002–2003. *Clinton Haley*

2:15 Restraint Use for Child Passengers Decreases Risk of Hospitalization and Multiple Injuries. *Karen C. Lee*

2:35 State Trauma Registry Assessment—Wyoming, 2000–2005. *Richard Luce*

2:55 Injuries from Motor-Vehicle Collisions with Moose—Maine, 2000–2004. *Araceli Rey*

3:15 BREAK

3:30 Session P: So What Did You Have for Lunch?: Foodborne Disease ..... Grand Ballroom
Moderator: Fred Angulo and Sharon Balter

3:35 Investigation of a Multistate Outbreak of *Escherichia coli* O157: H7 Illness—United States, 2005. *Nicholas Gaffga*

3:55 Suspected Paralytic Shellfish Poisoning—Corinto, Nicaragua, 2005. *Laura Conklin*

4:15 Recurrent Outbreak of *Salmonella* Newport Associated with Tomatoes—Eastern and Central United States, July–September, 2005. *Sharon Greene*

4:35 Use of Detailed Food Exposures Collected as Part of Routine Surveillance in Investigation of a Multistate Listeriosis Outbreak Linked to Turkey Deli Meat—United States, 2005. *Ann Schmitz*

8:30 EIS Satirical Revue ..... Grand Ballroom

Friday, April 28, 2006

8:30 Session Q: And the Band Is Still Playing… .: HIV Infection .....Grand Ballroom
Moderator: Tim Mastro

8:35 Human Immunodeficiency Virus Seroconversion Among Male Inmates in a State Prison System, 1992–2005. *Krishna Jafa*

8:55 Antiretroviral Therapy Among HIV-Infected Children in a Resource-Constrained Setting—Uganda 2004–2005. *Thomas Finkbeiner*

9:15 Can HIV Incidence Be Estimated from Cross-Sectional Serologic Surveys in Africa: Novel Application of a New HIV Incidence Laboratory Assay. *Andrea Kim*

9:35 Evaluation of Acute HIV Infection Surveillance—North Carolina, 2002–2005. *Brant Goode*

10:00 BREAK

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

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

10:30 Session R: The Latest and Greatest… .: Late-Breaking Reports .....Grand Ballroom
Moderator: Doug Hamilton

10:35 Late-Breaking Report — TBD

10:45 Late-Breaking Report — TBD

10:55 Late-Breaking Report — TBD

11:05 Late-Breaking Report — TBD

11:15 Late-Breaking Report — TBD

11:25 Late-Breaking Report — TBD

11:35 Late-Breaking Report — TBD

11:45 Late-Breaking Report — TBD

12:00 LUNCH

Friday, April 28, 2006 (Continued)

1:30 Session S: New Kids on the Block: Emerging Infectious Disease .....Grand Ballroom
Moderator: Paul Effler and Sarah Park

1:35 Severe *Clostridium difficile*-Associated Disease Among Populations Previously at Low Risk—Multiple States, 2005. *Felicia Lewis*

1:55 International Investigation of a Marburg Hemorrhagic Fever Outbreak—Uíge, Angola 2005. *Romulo Colindres*

2:15 Persistence of Antibody to Hepatitis E Virus and Occurrences of Sporadic Hepatitis E Infection—México, 1986–1995. *Ryan Novak*

2:35 Lymphocytic Choriomeningitis Virus Testing and Diagnosis—Connecticut, 2005. *Lynn Sosa*

2:55 Transmission of West Nile Virus Through Solid-Organ Transplantation—New York and Pennsylvania, 2005. *Benjamin Tsoi*

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

ABBREVIATIONS

Food and Drug Administration ..... FDA
National Center on Birth Defects and Developmental Disabilities ..... NCBDDD
National Center for Chronic Disease Prevention and Health Promotion ..... NCCDPHP
National Center for Environmental Health/
Agency for Toxic Substances & Disease Registry ..... NCEH/ATSDR
National Center for Health Statistics ..... NCHS
National Center for HIV, STD, and TB Prevention ..... NCHSTP
National Center for Infectious Diseases ..... NCID
National Center for Injury Prevention and Control ..... NCIPC
National Immunization Program ..... NIP
National Institute for Occupational Safety and Health ..... NIOSH
Office of Genomics and Disease Prevention ..... OGDP
Office of Director/Office of Workforce and Career Development ..... OWCD

PRESENTING EIS OFFICERS BY NATIONAL OFFICE

FDA
Su Wang

NCBDDD
Rebecca Bitsko
Emad Yanni

NCCDPHP
Lauren Zapata
Sherry Farr
Andrea Sharma
Parmi Suchdev

NCEH/ATSDR
Laura Conklin
Deidre Crocker
Avid Reza
Masja Straetemans
David Van Sickle
Fuyuen Yip

NCHS
Carolyn Tabak
Min Tao

NCHSTP
Rana Jawad Asghar
Kevin Cain
Sekai Chideya
Shona Dalal
Thu-Ha Dinh
Thomas Finkbeiner
Fatu Forna
Zsakeba Henderson
Michele Hlavsa
Dina Hooshyar
Krishna Jafa
Andrea Kim
Heather Lindstrom
Eric Pevzner
Sarita Shah
Andrew Voetsch

NCID
Nelson Arboleda
Ezra Barzilay
Deron Burton
Lauren Burwell
Douglas Chang
Alice Chapman
Adam Cohen
Romulo Colindres
James Eliades
Nicholas Gaffga
Hannah Gould
Gavin Grant
Sharon Greene
Diane Gross
Sundeep Gupta
Seema Jain
Michael Jhung
Hannah Jordan
Mark Katz
Mark Malek
Manoj Menon
Ryan Novak
Rosalyn O'Loughlin
Ciara O'Reilly
Roopal Patel
Pavlin Boris
Christina Phares
Ann Schmitz
Jacek Skarbinski
Eric Stern
Rebecca Sunenshine
Kristin Uhde

NCIPC
Robert Bossarte
Matthew Breiding
Karen Lee

NIOSH
Kristin Cummings
Judith Eisenberg
Margaret Riggs
SangWoo Tak
Christine West

NIP
Sucheta Doshi
Suchita Lorick
Meredith McMorrow
Amy Parker
Tom Shimabukuro

OWCD
Wendy Bamberg
Elizabeth Baraban
Pennan Barry
Lawrence Carpenter
Daniel Chertow
Anand Date
Luca Flamigni
Kate Gaynor
Mark Gershman
Tista Ghosh
Brant Goode
Juliana Grant
Clinton Haley
Angela Huang
Lyn James
Neely Kazerouni
Kathy Kudish
Mysheika Lemaile-Williams
Felicia Lewis
Richard Luce
Elizabeth Melius
Eric Miller
Gita Mirchandani
Alexandra Newman
Trang Nguyen
Ami Patel
Rachel Plotinsky
Araceli Rey
Sara Russell
Sukhminder Sandhu
Joshua Schaffzin
Carrie Shuler
Jonathan Siekmann
Lynn Sosa
Stephen Swanson
Esther Tan
Nato Tarkhashvili
Benjamin Tsoi
Mary Anne Wenck
Arthur Wendel
Jean Yuan

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 epidemiological 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 an individual for their valued contributions which 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 epidemiological 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 based on (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, M.D., 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.

ALEXANDER D. LANGMUIR LECTURES, 1972–2005

1972 Prevention of Rheumatic Heart Disease C 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 C Past, Present, and Future. *King K. Holmes*

1984 Poliomyelitis Immunization C 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*

ALEXANDER D. LANGMUIR PRIZE MANUSCRIPTS, 1966–2005

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 C Forty-Seven Cases Linked to Contact with Muskrats.
N Engl J Med 1969;280:1253-60.
L.S. Young, D.S. Bicknell, B.G. Archer, et al.

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

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

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

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

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

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

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

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

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

1983 Epidemic Listeriosis C Evidence for Transmission by Food. N Engl J Med 1983;308:203-6.
W.F. Schlech III, P.M. Lavigne, R.A. Bortolussi, et al.

1984 Unexplained Deaths in a Children's Hospital: An Epidemiologic Assessment. N Engl J Med 1985;313:211-6.
J.W. Buehler, L.F. Smith, E.M. Wallace, C.W. Heath, R. Kusiak, J.L. Herndon
and
Medication Errors with Inhalant Epinephrine Mimicking an Epidemic of Neonatal Sepsis. N Engl J Med 1984;310:166-70.
S.L. Solomon, E.M. Wallace, E.L. Ford-Jones, et al.

1985 The Use and Efficacy of Child-Restraint Devices: The Tennessee Experience, 1982 and 1983. JAMA 1984;252:2571-5.
M.D. Decker, M.J. Dewey, R.H. Hutcheson Jr., W.S. Schaffner

1986 The Role of Parvovirus B19 in Aplastic Crisis and Erythema Infectiosum (Fifth Disease). J Infect Dis 1986;154:383-93.
T.L. Chorba, P. Coccia, R.C. Holman, et al.

1987 Oral Contraceptives and Cervical Cancer Risk in Costa Rica: Detection Bias or Causal Association? JAMA 1988;259:59-64.
K.L. Irwin, L. Rosero-Bixby, M.W. Oberle, et al.

1988 A Day-Care-Based Case-Control Efficacy Study of *Haemophilus influenzae* B Polysaccharide Vaccine. JAMA 1988;260:1413-8.
L.H. Harrison, C. Broome, A.W. Hightower, et al.

Alexander D. Langmuir Prize Manuscripts, 1966 – 2005 (Continued)

1989 Group A Meningococcal Carriage in Travelers Returning from Saudi Arabia.
JAMA 1988;260:2686-9.
P.S. Moore, L.H. Harrison, E.E. Telzak,, G.W. Ajello, C.V. Broome
and
Transmission of *Plasmodium vivax* Malaria in San Diego County, California, 1986. Am J Trop Med Hyg 1990;42:3-9.
Y.A. Maldonado, B.L. Nahlen, R.R. Roberta, et al.

1990 An Outbreak of Surgical Wound Infections due to Group A *Streptococcus* Carried on the Scalp.
N Engl J Med 1990;323:968-72.
T.D. Mastro, T.A. Farley, J.A. Elliott, et al.

1991 An Investigation of the Cause of the Eosinophilia-Myalgia Syndrome Associated with Tryptophan Use.
N Engl J Med 1990;323:357-65.
E.A. Belongia, C.W. Hedberg, G.J. Gleich, et al.

1992 An Outbreak of Multidrug-Resistant Tuberculosis among Hospitalized Patients with the Acquired Immunodeficiency Syndrome. N Engl J Med 1992;326:1514-21.
B.R. Edlin, J.I. Tokars, M.H. Grieco, et al.

1993 Comparison of Prevention Strategies for Neonatal Group B Streptococcal Infection: A Population-Based Economic Analysis. JAMA 1993;270:1442-8.
J.C. Mohle-Boetani, A. Schuchat, B.D. Plikaytis, J.D. Smith, C.V. Broome
and
Retrospective Study of the Impact of Lead-Based Hazard Remediation on Children=s Blood Lead Levels in St. Louis, Missouri. Am J Epidemiol 1994;139:1016-26.
C. Staes, T. Matte, C.B. Copley, D. Flanders, S. Binder

1994 A Massive Outbreak in Milwaukee of Crytosporidium Infection Transmitted through the Public Water Supply. N Engl J Med 1994;331:161-7.
W.R. Mac Kenzie, N.J. Hoxie, M.E. Proctor, et al.

1995 A Multistate Outbreak of *Escherichia coli* 0157:H7-Associated Bloody Diarrhea and Hemolytic Uremic Syndrome from Hamburgers: The Washington Experience.
JAMA 1994;272:1349-53.
B.P. Bell, M. Goldoft, P.M. Griffin, et al.

1996 A Multistate Outbreak of *Salmonella enteriditis* Infections Associated with Consumption of Schwann=s Ice Cream. N Engl J Med 1996; 334:1281-6.
T.W. Hennessy, C.W. Hedberg, L. Slutsker, et al.
and
Passenger to Passenger Transmission of *Mycobacterium tuberculosis* Aboard Commercial Aircraft During Transoceanic Travel. N Engl J Med 1996;334:993-8.
T.A. Kenyon, S.E. Valway, W.W. Ihle, I.M. Onorato.

1997 Epidemic Meningococcal Disease and Tobacco Smoke: A Risk Factor Study in the Pacific Northwest.
Pediatr Infect Dis J 1997;16:979-83.
M.A. Fisher, K. Hedberg, P. Cardosi, et al.

1998 Suicide After Natural Disasters. N Engl J Med 1998;338:373-8.
E.G. Krug, M. Kresnow, J.P. Peddicord, et al.

1999 Legalized Physician-Assisted Suicide in Oregon C: The First Year's Experience.
N Engl J Med 1999;340:577-583.
A.E. Chin, K. Hedberg, G.K. Higginson, D.W. Fleming

2000 Infantile Hypertrophic Pyloric Stenosis After Pertussis Prophylaxis with Erythromycin: A Case Review and Cohort Study. Lancet 1999;354:2101-5.
M.A. Honein, L.J. Paulozzi, I.M. Himelright, B. Lee, J.D. Cragan, L. Patterson, A. Correa, S. Hall, J. D. Erickson

2001 *Salmonella* Typhimurium Infections Transmitted By Chlorine-Pretreated Clover Sprout Seeds. Am J Epidemiol. 2001 Dec 1;154(11):1020-8.
J.T. Brooks, S. Rowe, P. Shillam, D. Heltzel, S. Hunter, L. Slutsker, R.. Hoekstra, S. Luby

2002 *Serratia liquefaciens* Bloodstream Infections from Contamination of Epoetin Alfa at a Hemodialysis Center. N Engl J Med. 2001 May 17;344(20):1491-7.
LA Grohskopf, VR Roth, DR Feikin, MJ Arduino, LA Carson, JI Tokars, SC Holt, BJ Jensen, RE Hoffman, WR Jarvis

2003 Transmission of West Nile Virus from an Organ Donor to Four Transplant Recipients.
N Engl J Med. 2003; 348:2196-2203, May 29, 2003.
M. Iwamoto, D.B. Jernigan, A. Guasch, M.J. Trepka, C.G. Blackmore, W.C. Hellinger, S.M. Pham, S. Zaki, R.S. *Lanciotti, S.E. Lance-Parker, C.A. DiazGranados, A.G. Winquist, C.A. Perlino, S. Wiersma, K.L. Hillyer, J.L. Goodman, A.A. Marfin, M.E. Chamberland, L.R. Petersen, the West Nile Virus in Transplant Recipients Investigation Team*

2004 Risk of Bacterial Meningitis in Children with Cochlear Implants.
N Engl J Med. 2003; 349:435-445, Jul 31, 2003.
J. Reefhuis, M.A. Honein, C.G. Whitney, S. Chamany, E.A. Mann, K.R. Biernath, K. Broder, S. Manning, S. Avashia, M. Victor, P. Costa, O. Devine, A. Graham, C. Boyle

2005 Changes in Invasive Pneumococcal Disease Among HIV-Infected Adults Living in the Era of Childhood Pneumococcal Immunization. Ann Intern Med .2006 Jan 3;144(1):1-9
B.L. Flannery, R.T. Heffernan, L.H. Harrison, S.M. Ray, A.L.Reingold, J. Hadler, W. Schaffner, R. Lynfield, A.R. Thomas, J. Li, M.Campsmith, C.G. Whitney, and A.Schuchat

AWARDS PRESENTED AT 2005 CONFERENCE

Alexander D. Langmuir Prize Manuscript Award

Changes in Invasive Pneumococcal Disease Among HIV-Infected Adults Living in the Era of Childhood Pneumococcal Immunization

B.L. Flannery, R.T. Heffernan, L.H. Harrison, S.M. Ray, A.L. Reingold, J.Hadler, W. Schaffner, R. Lynfield, A.R. Thomas, J. Li, M. Campsmith, C.G. Whitney, and A. Schuchat

Donald C. Mackel Memorial Award

Case-Control study of an Acute Aflatoxicosis Outbreak

E. Azziz-Baumgartner, K. Lindblade, K. Gieseker, H. Rogers, S. Kieszak, H. Njapau, Rschleicher, L. McCoy, C. Pfeiffer, A. Misore, K. DeCock, C. Rubin, L. Slutsker, and the Aflatoxin Investigative Group

Outstanding Poster Presentation Award

Risk of Secondary Transmission from Imported Lassa Fever — New Jersey, 2004

E. Tan, N. Karabulut, M. Bell, P. Aufiero, S. Shah, D. Rumowitz, C. Tan, C. Robertson, B. Piepszak, J. Nsubuga, M. Guerra, M. Cetron, s. Shapiro, s. Zaki, T. Ksiazek,

Philip S. Brachman Award

Julie Magri

Paul C. Schnitker International Health Award

Oleg Bilukha

Iain C. Hardy Award

Julie Jacobson-Bell

James H. Steele Veterinary Public Health Award

John Crump

J. Virgil Peavy Memorial Award

Andrea Sharma

Alexander D. Langmuir Prize Manuscript Award

Philip Brachman (EIS ’54)
Christine Branch (EIS ’88)
Marion Kainer (EIS ’00)
Janet Mohle-Boetani
John V. Rullán

Donald C. Mackel Memorial Award

Antonia Calafat
Jill Ferdinands (EIS ’00)
Susan Goldstein (EIS ’93)
Pat Lammie
George Luber (EIS ’02)
Steve Monroe

Outstanding Poster Presentation Award

Mick Ballesteros (EIS ’01)
Bruce Bernard (EIS ’89)
Laura Northern
Cynthia Ogden (EIS ’94)

Paul C. Schnitker International Health Award

Claire Broome (EIS ’77)
Lisa Cairns (EIS ’96)
Doug Hamilton (EIS ’91, ex officio)
Rubina Imtiaz (EIS ’84)
Steve Jones (EIS ’69, ex officio)
Frank Richards (EIS ‘82)
Alexander Rowe (EIS ’94)
Myron Schultz (EIS ’63)

Iain C. Hardy Award

Rita Helfand (EIS ’92)
Hamid Jafari (EIS ’92)
Alison Mawle
John Modlin (EIS ’73)
William Schaffner (EIS ’66)
Melinda Wharton (EIS ’86)

James H. Steele Veterinary Public Health Award

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

J. Virgil Peavy Memorial Award

Ileana Arias
Jennita Reefhuis (EIS ’01)
Jeffrey J. Sacks (EIS ’79)
David J. Sencer (EIS ’75)
Donna F. Stroup, (EIS ’01, Honorary)
G. David Williamson

55th Annual Epidemic Intelligence Conference
April 24-28, 2006

Centers for Disease Control and Prevention
Atlanta, Georgia

Continuing Education Credits

CEU

The Centers for Disease Control and Prevention (CDC) has been reviewed and approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET). CDC has awarded 3.25 CEUs to participants who successfully complete this program.

CME

CDC is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. CDC designates this educational activity for a maximum of 32.5 hours in category 1 credit towards the AMA Physician's Recognition Award.

Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

CNE

This activity for 39 contact hours is provided by CDC, which is accredited as a provider of Continuing Nursing Education by the American Nurses Credentialing Center's Commission on Accreditation.

This year ALL continuing education credits for the Epidemic Intelligence Service (EIS) Conference will be issued through the CDC/ATSDR Training and Continuing Education Online System. You must go to the Online System to complete the session evaluations to receive credit.

To register for any of the three categories of continuing education credits (CME, CNE, CEU), please go to **http://www.cdc.gov/phtnonline/**
Instructions and sample evaluation forms are included here.

Instructions for Completing Online 55th Annual EIS Scientific Conference Evaluations

- Go to the CDC/ATSDR Training and Continuing Education Online at **http://www.cdc.gov/phtnonline/**. If you have not registered as a participant, click on **New Participant** to create a user ID and temporary password; otherwise click on **Participant Login** and login.

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

- E-mail at: **CE@cdc.gov**
- Fax at **404-498-6045**
- Phone: **1-800-41-TRAIN (press 1 then 5) or 404-639-1292**, during business hours (Monday-Friday) 8am-4:30pm E.T. After hours, you may leave a voice message and your call will be returned the next business day.

- After logging onto the *CDC/ATSDR Training and Continuing Education Online* website, you will be on the **Participant Services** page. Click on **Search and Register**. At the **bottom right corner** of this page, click on **CDC Courses**.

- On the next page, you will be asked to enter the **CDCCenter/Course Code**. The Course Code for this course is **EISCONF06**. Click **View** to advance to the next page. Click on **55th Annual EIS Scientific Conference**. Choose the appropriate Continuing Education Credit and then click **Submit**.

- You will then see a list of sessions. Register for those sessions you plan to attend.

A message will come up with information about the conference. You may choose to go immediately to the evaluation. Answer each of the questions listed and then click on Submit.

You will have 30 days (until 11:59PM EDT on May 28, 2006) from the date of the Conference to complete and submit your on-line evaluations. Evaluations will not be accepted after this date.

After the evaluation is submitted, you will be redirected to the **Participant Services** page. From there, you can view your transcript and certificate.

If you experience any problems completing the evaluation, please contact OWCD by using the previous contact information.

EIS CLASS OF 2006 (as of February 13, 2006)

Bailey, Rachel L., DO, MPH
Bamrah, Sapna, MD, MPH
Barton, Casey E., MS, DVM, DrPH
Beavers, Suzanne, MD, MPH
Bish, Connie L., MS, MPH, PhD
Blaney, David D., MD, MPH
Blossom, David B., MD, MS
Boehmer, Tegan K., MPH, PhD
Brunkard, Joan M., PhD
Buff, Ann M., MD, MPH
Buss, Bryan F., DVM, MPH
Chai, Shua J., MD
Chen, Tai-Ho, MD
Christian, Kira A., DVM, MPH
Cooper, Michael P., MD, MS
Dale, Helen Mary, BVSc, MBChB
Dang, Bich Ngoc, MD
Densmore, Dianna, MS, PhD
Dorsey, Rashida R., MPH, PhD
Dubray, Christine, MD, MSc
Dufficy, Deborah L., DVM, MPH
Duffy, Mark R., DVM, MPH
Ehrhardt, Derek T., MSN, MPH
Ellingson, Katherine D., M.Phil, PhD
Fagan, Ryan, MD, MPH
Fischer, Gayle E., MD, MPH
Gibbins, John D., DVM, MPH
Glenshaw, Mary T., MPH, PhD
Gong, Fang, MA, PhD
Goodson, Jim, BSN, MPH
Gould, Philip L., MD, MPH, MTM&H
Grigoryan, Anna, MD, DM, MSC CH HM
Gulati, Reena, MD
Gutelius, Bruce, MD, MPH
Hall, Aron J., DVM, MSPH
Hausman, Leslie, MPH
Hinton, Cynthia F., MS, MPH, PhD
Holzbauer, Stacy M., DVM, MPH
Johnson, April J., DVM, MPH, PhD
Juliao, Patricia C., MPH, PhD
Kallen, Alexander J., MD, MPH
Kim, Thomas J., MD, MPH
Laney, A. Scott, MPH, PhD
Langer, Adam J., DVM, MPH
Lessa, Fernanda C. C., MD, MPH
Li, Jun, MD, MS, MPH, PhD
Logan, Joseph E., MAE, MHS, PhD
Loringer, Kelly A., ND, MPH
Lucero, Cynthia A., MD
Luckhaupt, Sara E., MD, MPH
Lynch, Heather J., MD, MPH
Marano, Cinzia, MS, PhD
McIntyre, Anne F., MPH, PhD
Miles, Isa Williams, MS, ScD
Miramontes, Roque, PA-C, MPH
Moore, Zackary S., MD, MPH
Morrison, Teresa A., MD, MPH
Muhammad, Riyadh D., MD, MPH
Olson, Christine K., MD, MPH
Peters, Philip J., MD
Philip, Celeste M., MD, MPH
Rentz, Ericka Danielle, MPH, PhD
Resnick, Melissa, DVM, MPH
Rolle, Italia V., MS, PhD
Selvam, Nandini, MPH, PhD
Sharapov, Umid M., MD, MSc
Sheth, Anandi N., MD
Shinde, Vivek M. MD, MPH
Sodha, Samir V. MD, MPH
Su, John R., MD, MPH, PhD
Tai, Eric W., MD, MS
Tate, Jacqueline, MSPH, PhD
Thompson, Nicola D., MS, PhD
Thwing, Julie I., MD
Trevino, Ingrid C., DVM, MPH
Valderrama, Amy L., MSN, PhD
Van Dyke, Melissa K., MPH, PhD
Verani, Jennifer R., MD, MPH
Walter, Nicholas, MD, MS
Wendelboe, Aaron M., MS, PhD
Wiersma, Petra G., MD
Williams, Corrine, ScM, ScD

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

Monday, April 24, 2006
Session A: Ever-Interesting Stories: Opening Session
Grand Ballroom
8:30 a.m.–10:15 a.m.

Moderators: Julie L. Gerberding and Stephen B. Thacker

Large Outbreak of Cryptosporidiosis Associated with a Recreational Water Spraypark — New York, 2005
8:35 a.m.

Authors: Joshua K. Schaffzin, J. Keithly, G. Johnson, D. Sackett, D. Hoefer, L. Hoyt, M. Lurie, A. Teal, B. Rosen, N. Tavakoli, K. St. George, E. Braun-Howland, B. Wallace

Background: *Cryptosporidium* species, increasingly prevalent in waterborne outbreaks, can cause severe diarrhea. Standard treatment of recreational water does not remove species of *Cryptosporidium*. During July–August 2005, an outbreak of diarrheal illness occurred among users of a state-sponsored recreational water spraypark. We investigated to determine risk factors for illness and recommend control measures.

Methods: A confirmed case of cryptosporidiosis was 1) diarrhea (≥3 stools in 24 hours), vomiting, abdominal cramps, or appetite loss; 2) symptom onset within 14 days of park visit; and 3) positive laboratory test for *Cryptosporidium* species. A probable case met criteria 1 and 2 only. Stool samples were tested for parasites and bacteria; a subset underwent *Cryptosporidium* genotyping and viral-detection assays. Case-control and cohort studies were conducted. An environmental investigation evaluated samples collected at the park and spraypark function.

Results: Preliminary analysis identified 425 confirmed and 1,374 probable case-patients; of 149 isolates genotyped, 148 (99%) were *Cryptosporidium hominis* (primarily a human pathogen). Forty-five percent (17/39) of *Cryptosporidium*-positive stools tested for viral pathogens were positive for at least one. Persons reporting water-spray exposure on their face (odds ratio [OR]:9.5; 95% confidence interval [CI]=1.5–56) or in their mouth (OR:16.5; 95%CI=3.2–84) were at increased risk for illness. C. hominis was detected in spraypark and septic-tank water but not in potable or lake water. The spraypark functioned by a water-recycling system; filtration and disinfection were insufficient to remove *Cryptosporidium* oocysts.

Conclusions: This outbreak was caused by spraypark water contamination from a human, likely fecal, source. Spraypark design probably contributed to persistent contamination. In response, New York State passed emergency public health regulations to reduce the risk for cryptosporidiosis from recreational water sprayparks.

Keywords: *Cryptosporidium*, recreational water, spraypark, waterborne

Investigation of Carbon Monoxide Poisonings After Hurricane Katrina — Alabama, 2005
8:55 a.m.

Authors: Deidre D. Crocker, R. Funk, J.P. Lofgren, A. Stock, J. Ferdinands, J. Kattan, D. Van Sickle, R. Moolenaar, C. Pertowski

Background: Gasoline-powered portable generators are increasingly implicated as sources of carbon monoxide (CO) poisoning after hurricanes. Despite public warnings, CO exposures from generators reportedly caused 34 poisonings in Alabama following Hurricane Katrina. We investigated these poisonings to determine the extent of the problem, identify risk factors, and develop prevention strategies.

Methods: We defined a case of CO poisoning as illness with an ICD-9 code consistent with CO poisoning in a person with an elevated carboxyhemoglobin (COHb) level (>2 for nonsmokers and >9 for smokers). We reviewed records from eight area hospitals for demographic and clinical information. One adult member of each case household participated in home interviews and generator inspections.

Results: The 34 nonfatal cases of CO poisoning occurred in 12 separate poisoning events. No fatalities were identified. Households from nine of the 12 events participated. Portable generators were implicated in all CO poisoning events. Eight (89%) households had operated their generators outdoors but close to their homes; six (67%) households heard CO prevention messages before the incident. Generators were most commonly placed near the home to protect them from the weather (44%). In four (44%) events, poisonings occurred in rooms where window air conditioners were operating. Four households each had a CO detector when the poisonings occurred, but three detectors had dead batteries at the time.

Conclusions: CO poisoning occurred in most of these households despite efforts to heed prevention messages. Recommendations for reducing future CO poisonings should emphasize locating generators away from the home, away from window air conditioners, and changing CO detector batteries regularly. Generator design modifications (e.g., weatherization and CO emissions reduction) might reduce the incidence of CO poisonings more effectively.

Keywords: carbon monoxide poisoning, power sources, indoor air pollution, natural disasters, Alabama

Evidence-Based Approach To Improving Tuberculosis Screening Among Persons with HIV Infection — Cambodia, 2005
9:15 a.m.

Authors: Kevin P. Cain, N. Kanara, K. Laserson, C. Vannarith, C. Wells, J. Varma

Background: Tuberculosis (TB) is the leading cause of death among HIV-infected persons worldwide. In Cambodia, 25% of HIV-infected TB patients die, compared with 5% of HIV-uninfected TB patients. Using data from a project designed to screen HIV-infected persons for TB disease in Banteay Meanchey province, we sought to identify barriers to TB screening and target interventions accordingly.

Methods: We performed multivariate analysis on data from patients diagnosed with HIV 1/2004–2/2005 to find factors associated with not being screened for TB. Based on our analysis, we designed an intervention and reassessed screening rates 4/2005–7/2005.

Results: Of 1228 persons diagnosed with HIV, 450 (37%) were screened for TB disease; 107 (24%) of these were diagnosed with TB. In multivariate analysis, factors independently associated with not being screened included occupation as a semi-skilled or skilled worker (adjusted odds ratio [aOR] 2.1; 95% confidence interval [CI] 1.2–3.5) and self-report of no symptoms at the time of HIV testing (aOR 2.1; 95% CI 1.6–2.7). Of the 21 semi-skilled or skilled workers screened, 11 (52%) were diagnosed with TB. Of 261 screened patients reporting no symptoms at HIV testing, 57 (22%) were diagnosed with TB. Because TB was common even among groups less likely to be screened, we implemented a standardized script to be read to persons newly diagnosed with HIV explaining benefits of screening. In the four months after this intervention, 169 (61%) of 277 HIV-infected persons were screened, an increase of 65% ($p<0.01$).

Conclusions: TB was common among all HIV-infected persons screened, including those less likely to be screened. In Cambodia, all HIV-infected persons should be screened for TB; simple interventions substantially improved screening rates.

Keywords: tuberculosis, HIV, Cambodia, mortality, diagnosis, mass screening

National Estimates of Intimate Partner Violence from the Behavioral Risk Factor Surveillance System — 17 U.S. States and Territories, 2005
9:35 a.m.

Authors: Matthew J. Breiding, M. Lynberg

Background: Intimate Partner Violence (IPV) has been shown to have serious health consequences for both women and men, including poor general health, depressive symptoms, substance use, and elevated rates of chronic disease. Despite the public health importance of IPV, there have been no national studies estimating the prevalence since 1995, aside from crime surveys which are believed to underestimate the prevalence. In addition, the lack of state-specific data has hampered efforts at designing and evaluating localized IPV prevention programs.

Methods: An IPV module was included for the first time within BRFSS in 2005 and administered to more than 48,000 people within 15 U.S. states/territories. Estimates of lifetime and one-year prevalence were calculated from preliminary, unweighted data and these estimates were examined by gender, state of residence, race/ethnicity, and age.

Results: Approximately 22.4% (14.9% of men, 27.2% of women) of respondents reported IPV victimization within their lifetime and 1.2% (0.7% of men, 1.5% of women) experienced IPV within the past year. Lifetime prevalence estimates ranged from 18.4% to 29.4% among participating states/territories, while one-year prevalence estimates ranged from 0.4% to 2.7%. Annual prevalence ranged from 1.0% among non-Hispanic White respondents to 2.2% among Native American/Alaskan respondents, and ranged from 0.2% among those over age 55 to 3.8% among those aged 18-24 years.

Conclusions: The finding that approximately 1 in 7 men and 1 in 4 women have been victims of IPV in their lifetime underscores the importance of IPV as a significant public health problem. State-specific estimates of IPV prevalence and information about the subgroups most impacted will aid in the design and evaluation of programs aimed at preventing IPV.

Keywords: intimate partner violence; sexual violence; relationship violence

Investigation of the Largest Measles Outbreak in the United States in a Decade — Indiana, 2005: Implications for Sustaining Measles Elimination
9:55 a.m.

Authors: Amy A. Parker, W. Staggs, G. Dayan, I. Ortega-Sánchez, P. Boardman, C. Graves, C. LeBaron

Background: The World Health Organization estimates that measles causes 530,000 deaths annually worldwide. Ongoing measles virus transmission was eliminated from the US in 2001, but measles remains endemic in most other nations. In May 2005, a 17 year old unvaccinated girl who was incubating measles returned from a trip to Romania. Over six weeks, 33 secondary cases occurred creating the largest US measles outbreak since 1996. We investigated with the goal of examining the sustainability of US measles elimination.

Methods: Our investigation objectives focused on: 1) transmission patterns, 2) outbreak containment costs, and 3) whether new vaccination policies were needed. We determined transmission patterns through interviews with cases and contacts. We assessed measles vaccination coverage rates by school vaccination record surveys. We estimated costs of outbreak containment from surveys of health officials.

Results: Three persons were hospitalized, including one who required mechanical ventilation, and 18 suffered disease complications. Children whose parents objected to vaccination comprised 88% of all cases, with four households accounting for 71% of the cases. Large-scale spread outside the vaccine objector community was averted by high community measles immunization rates of 96% by five years of age. Overall containment costs were $165,000, of which >$100,000 were hospital-specific costs resulting from exposures by an infected employee who had not received the recommended two doses of measles vaccine.

Conclusions: This import-associated outbreak occurred because of failure to adhere to existing vaccination policies for preventing measles in US residents who travel abroad, children, and health care workers. Enhanced implementation of these policies and more effective communication strategies with vaccine objector groups may be needed to prevent future costly outbreaks and sustain US measles elimination.

Keywords: measles, vaccine, outbreak, vaccine objector, policy

Monday, April 24, 2006
Session B: Cause I'm A Woman: Woman's Health
Grand Ballroom
10:45 a.m. - 12:15 p.m.
Moderator: Yvonne Green

Periconceptional Intake of Vitamins Containing Folic Acid and Risk for Multiple Congenital Anomalies—Iowa, 1993–1995
10:50 a.m.

Authors: Rebecca H. Bitsko, J. Reefhuis, C. Moore, P. Romitti, M. Honein

Background: Periconceptional intake of folic acid (FA) is recommended because FA can reduce the occurrence of neural tube defects. However, two studies have shown positive associations between maternal periconceptional FA use and the occurrence of multiple congenital anomalies (MCA). Because 33% of childbearing aged women take FA, it is of great public health importance to determine if this association is true. We examined whether FA exposure through vitamin intake was associated with MCA in a third population.

Methods: Mothers of case (MCA) or selected control (no birth defects) infants, born in Iowa from 1993 through 1995 were interviewed by telephone. Detailed information on FA exposure for the 3 months prior to pregnancy and the first trimester was collected.

Results: No differences in maternal race, education, age, body mass index (BMI), alcohol or cigarette use during the first trimester were observed between mothers of case (n=144) and control (n=247) infants. Having been pregnant three or more times was associated with having an infant with MCA. Race, gravidity, and BMI were not associated with FA exposure, while fewer than 12 years of education and use of alcohol or cigarettes during the first trimester were negatively associated. FA exposure beginning in the 3 months prior to pregnancy (odds ratio [OR] 1.09, 95% confidence interval [CI] 0.61-1.97) or the first trimester (OR 0.95, 95% CI 0.54-1.69) was not associated with MCA. Adjusting for gravidity, education, alcohol use, and smoking did not affect these results.

Conclusions: These preliminary results do not support previous findings and suggest that periconceptional intake of multivitamins containing FA is not associated with MCA. Further analyses will address the discordant findings between this and previous studies.

Keywords: birth defects, multiple congenital anomalies, vitamins, pregnancy, folic acid

Human Papillomavirus Prevalence and Incidence Among Girls Attending an Adolescent Innercity Clinic — Atlanta, Georgia, 1999–2004
11:10 a.m.

Authors: Thu-Ha Dinh, E.H. Koumans, D. Carey, J. Braxton, M.K. Sawyer, E.F. Dunne, E.R. Unger, L.E. Markowitz.

Background: Over 40 human papillomavirus (HPV) types are sexually transmitted, including HPV-16 and -18 which cause about 70% of cervical cancers and HPV-6 and -11 which cause 90% of genital warts. Vaccines in development against HPV-6, -11, -16, and -18 (vaccine-types) have high efficacy. We evaluated prevalence and cumulative incidence of HPV and HPV vaccine-types in sexually active girls to assess the potential benefit of HPV vaccine in this population.

Methods: In a prospective study, we enrolled female-adolescent clinic attendees who were sexually active, non-pregnant, and 13-19 years-old. Cervical swabs collected at twice-yearly scheduled visits were tested for HPV-DNA using L1 consensus PCR and typed using line probe hybridization. Participants with at least two visits were included in the analysis.

Results: Among 352 participants, mean age was 16.4 years (median, 16.5); mean number of lifetime sex partners was 5.5 (median, 4); mean follow-up time was 17 months (median, 13). At baseline, HPV was detected among 230 (65%) participants; 72 (20%) participants had at least one HPV vaccine-type; 30 (8.5%) had HPV-6 or -11; 51 (14.5%) had HPV-16 or -18; some had more than one type. Among those HPV-negative at baseline, cumulative incidence was 94% for at least one HPV type. Cumulative incidence among those negative at baseline to respective types was 32% for any HPV vaccine-type; 13% for HPV-6 and/or -11; 24% for HPV-16 and/or -18. No participant had all four vaccine-types at baseline or follow-up.

Conclusions: Ideally, HPV vaccine should be administered before sexual debut. Despite high HPV prevalence and incidence, no participant had evidence of infection with all vaccine-types. Therefore, HPV vaccine is also likely to provide some benefit in sexually active adolescents.

Keywords: human papillomavirus, prevalence, incidence, HPV vaccine, adolescents

Trends in Gestational Diabetes and Pregnancy-Related Hypertension Among Women — Los Angeles County, 1991–2003
11:30 a.m.

Authors: Elizabeth A. Baraban, L. McCoy, P. Simon

Background: Obese women have a two- to fivefold increased risk for gestational diabetes (GD) and pregnancy-related hypertension (PRH). Surveillance data in Los Angeles County (LAC) indicate a 25% increase in obesity prevalence among women of childbearing age during 1997–2003. Although obesity rates are on the rise, knowledge is limited about trends in GD and PRH among LAC women.

Methods: To investigate trends in GD and PRH in LAC, we analyzed hospital discharge data for 1991–2003. The analysis included all LAC residents who were hospitalized for a delivery during this period. Discharge diagnoses were used to identify cases of GD and PRH. Age-adjusted prevalence for each outcome was calculated by year and race/ethnicity. Multivariable Poisson regression models adjusting for race/ethnicity and age were performed to test for significant change in rates of GD and PRH over time. Models were also calculated for each racial/ethnic group.

Results: Overall, the age-adjusted prevalence of GD increased from 2.41% to 6.86% during 1991–2003. PRH increased from 5.14% to 6.34%. In the multivariable analyses, GD increased 9%/year ($p<0.0001$), and PRH increased 3%/year ($p<0.0001$). The rate increase per year for GD was highest among Hispanics (10%), followed by blacks (8%) and whites (7%). The rate increase per year for PRH was highest among blacks (5%), followed by Hispanics (3%) and whites (3%).

Conclusions: These findings indicate that the obesity epidemic among women of childbearing age might be contributing to an increase in GD and PRH in LAC. Further research is needed to confirm this association. However, these findings highlight the need for pre- and postconception interventions that address the underlying risk factors for GD and PRH.

Keywords: obesity, gestational diabetes, pregnancy, birth, women

Responding to the Changing Epidemiology of Syphilis: Exploratory Interviews of Women with Early Syphilis — Chicago, Illinois, 2005
11:50 a.m.

Authors: Heather A. Lindstrom, L. Branch, G. Conda, C. Davis, T. Peterman, I. Tabidze, W. Wong and C. Ciesielski

Background: In 2003, the primary and secondary (P&S) syphilis rate among women in the United States reached an all-time low. In 2004, reports of P&S syphilis among women in Chicago increased 57% from 30 cases in 2003 to 47 cases, signaling a potential resurgence of syphilis among women. Partner notification interviews did not identify common risk factors and could not explain the increase. A resurgence of syphilis among women could lead to increases in congenital syphilis. We sought to gather information that might help avert such increases.

Methods: Exploratory interviews were conducted with women diagnosed with early (P&S and early latent [EL]) syphilis in Chicago in 2005. Unstructured, ethnographic interviews of 30-60 minutes were conducted at women's homes/by phone regarding sex partner selection and perceived safety, risk behaviors, sexually transmitted disease (STD) knowledge and prevention.

Results: Fourteen women were interviewed: 8 P&S and 6 EL syphilis patients; median age=22.5 years (range 17-43); 13 African-Americans, one Hispanic. Women perceived themselves at low-risk. Risk factors identified in prior syphilis epidemics were absent. Women reported a median of 2 sex-partners (range 1-6) in the 6-12 months prior to diagnosis. Two women reported drug use. None exchanged sex for money/drugs; none were incarcerated. One reported anonymous sex. Prior to diagnosis, women were unaware of syphilis, but knew about other STDs. Women's sex partners tended to be: met within their neighborhoods; long-time acquaintances or introduced by family/friends; and considered safe. Women's main prevention strategy was trusting partners.

Conclusions: Potential risk factors for syphilis among women in Chicago were not identified. Continued vigilance and early response to local changes in syphilis epidemiology will be needed to avert epidemics.

Keywords: syphilis, women, risk factor, ethnographic interviews

Monday–Wednesday Poster Session
Meet The Authors
Grand Ballroom
12:30 p.m.–1:30 p.m.

Posters 1–15

Poster 1
Oops...It Happened Again: Periodic Trends in *Shigella sonnei* Outbreaks Among Children Aged 0–9 Years

Authors: Ezra J. Barzilay, E.C. Smith, C.B. Ivey, E. Mintz, R.M. Hoekstra

Background: *Shigella sonnei* is a common cause of gastroenteritis in infants and young children. It is transmitted from person-to-person by fecal-oral contact and requires a very small inoculum to cause disease. Extensive shigellosis outbreaks involving children in multiple childcare centers occur frequently in U.S. cities and are difficult to control. We examined public health surveillance data from 1970 to 2002 for inherent periodic trends in *Shigella sonnei* outbreaks in U.S. cities.

Methods: *Shigella* surveillance data was obtained from the Public Health Laboratory Information System (PHLIS). We aggregated individual counties into Metropolitan Statistical Areas (MSA) according to 2002 U.S. Census definitions. We calculated annual MSA-specific rates for *S. sonnei* among children age 0-9 years. We stratified MSAs geographically as coastal (eastern, western seaboard) or non-coastal and formed time-series for 345 MSAs with composite populations between 50,000 and 3,000,000 people and consistent surveillance data. We performed spectral analyses of the time series obtained, to examine if their spectral densities shared a common period.

Results: Eastern coastal MSA show peak *Shigella* rates every 2.75, 5.5 and 8.25 years (spectral densities of 0.14, 0.22 and 0.236 respectively). Non-coastal MSA show peak *Shigella* rates every 2.75 and 5.5 years (spectral densities of 0.127 and 0.213). Western coastal MSA show peak *Shigella* rates every 2.75, 3.67 and 6.6 years (spectral densities of 0.143, 0.176 and 0.403).

Conclusions: *S. sonnei* infection rates in children 0-9 years old demonstrate marked periodicity. This finding may reflect cycling changes in the susceptible population of young children attending childcare centers – a favorable environment for *S. sonnei* transmission – and could lead to better prediction and prevention of shigellosis outbreaks.

Keywords: Periodicity, Shigella, surveillance, trends

Poster 2
Outbreak of *Escherichia coli* O157:H7 Related to Direct and Indirect Animal Contact in Petting Zoos — Florida, 2005

Authors: Daniel S. Chertow, S. Gupta, D. Ginzl, C. Long, R. Hopkins, C. Braden, J. Schulte, C. Blackmore

Background: *Escherichia coli* O157:H7 causes an estimated 70,000 infections annually in the United States and can result in bloody diarrhea, hemolytic uremic syndrome (HUS), and death. We investigated an *E. coli* O157:H7 outbreak related to two Florida petting zoos, where animals were primarily behind barriers and hand-hygiene stations were available to the public, to identify risk factors and develop prevention measures.

Methods: We conducted an environmental and case-control study. Laboratory specimens were obtained from the grounds and animals of the two zoos. A case was defined as laboratory-confirmed *E. coli* O157:H7, HUS, or a compatible diarrheal illness in a person who visited one of the two implicated petting zoos during March 3–13, 2005. Control subjects were selected from visitors during the same time period and were frequency-matched by age. We administered a standardizing telephone questionnaire and conducted stratified data analysis controlling for age group and zoo attended.

Results: *E. coli* isolates from the zoo grounds and animals matched the human outbreak strain. Illness was associated with multiple types of direct and indirect animal contact including feeding a cow (Mantel-Haenszel odds ratio [MH-OR]: 5.8; 95% confidence interval [CI]=2.4–13.9) and stepping in manure (MH-OR: 23.6; CI=3.9–142.1). Creating a lather with soap during hand washing after visiting the petting zoo (MH-OR: 0.1; CI=0.0–0.6) and washing hands before eating after visiting the petting zoo (MH-OR: 0.3; CI=0.1–0.9) protected against illness.

Conclusions: Serious outbreaks of *E. coli* O157:H7 can occur despite placing animals behind barriers and having hand-hygiene stations available. Additional protective measures (e.g., displays about proper hand washing and disinfectant foot baths) might reduce the frequency and severity of future outbreaks.

Keywords: *Escherichia coli*, zoonotic disease, outbreak, hemolytic uremic syndrome

Poster 3
Epidemiologic and Laboratory Surveillance for Bacterial and Rotavirus Diarrhea Among Rural Western Kenya Children, 2005

Authors: Ciara E. O'Reilly, E.L.Yee, B. Ochieng, G. Okoth, R.S. Beard, M. Bird, E. Blanton, J.T. Brooks, J. Vulule, R. Breiman, D. Feikin, L. Slutsker, C. Bopp, M.A. Widdowson, E. Mintz.

Background: Diarrhea is a major cause of childhood morbidity and mortality in Kenya. We conducted clinic and hospital-based surveillance to characterize the severity and etiology of diarrheal disease in rural western Kenyan children.

Methods: We enrolled all children <5 years old presenting with diarrhea (≥3 loose stools in 24 hours) in six outpatient clinics, and all children admitted for diarrhea to two district hospitals in western Kenya. Clinical and demographic information, and a stool sample, were collected. Specimens were tested for enteric bacterial pathogens and rotavirus. Antimicrobial susceptibilities were determined for bacterial pathogens.

Results: From May to October 2005, we enrolled 81 outpatient and 196 inpatient children. More outpatients than inpatients presented with bloody diarrhea (12% versus 6% respectively, $p=0.06$) and fever (81% and 69%, $p<0.05$), and fewer outpatients presented with watery diarrhea than inpatients (78% and 88% respectively, $p<0.05$). Six (7%) outpatients and 154 (79%) inpatients received intravenous fluid rehydration therapy. We identified at least one pathogen in 21 (26%) outpatient and 88 (45%) inpatient stools. Rotavirus was detected in 5 (14%) outpatients and 31 (17%) inpatients. Non-Typhi *Salmonella* were detected in 4 (5%) and 29 (15%), Shigella were detected in 4 (5%) and 9 (5%) and *Campylobacter* were detected in 8 (10%) and 19 (10%), outpatients and inpatients respectively. No *Vibrio cholerae* or *Salmonella Typhi* were isolated. Bacterial pathogens from outpatients and inpatients were highly resistant to trimethoprim-sulfamethoxazole (88% and 92% respectively), ampicillin (88% and 89%), and chloramphenicol (63% and 76%).

Conclusions: Bacterial pathogens and rotavirus are substantial causes of morbidity in rural western Kenyan children. Immunization with an effective rotavirus vaccine and treatment with appropriate antimicrobial agents would reduce this burden.

Keywords: enteric bacteria, rotavirus, diarrhea, surveillance, morbidity, Kenya

Poster 4
Increasing Rates of *Clostridium difficile*-Associated Disease in Hospitals — New Jersey, 2000–2004

Authors: Esther T. Tan, S. Brynildsen, C. Robertson, E. Bresnitz, C. Tan, L.C. McDonald

Background: *Clostridium difficile*-associated disease (CDAD) is a leading cause of healthcare-associated infection causing substantial morbidity and mortality. Unlike other common healthcare-associated pathogens, limited reports have been published on CDAD rates in hospitalized patients. To address the lack of comparative data, we conducted a survey to determine the range of CDAD rates in NJ acute care hospitals during 2000– 2004.

Methods: An online survey was distributed to infection control professionals (ICPs) of all NJ hospitals. Each ICP was asked to provide information on case numbers, patient-days and hospital characteristics. Case definitions were provided and laboratory diagnoses were determined by individual hospitals.

Results: 58 (72%) of 81 hospitals responded. The median number of licensed beds was 291 (range 77-683) and median number of ICPs per 250 beds was 1.22 (range 0.4-2.9). Fifty-two (90%) hospitals used an enzyme immunoassay test for toxin A and B as a diagnostic test for CDAD. CDAD case rates increased during the 5-year interval, from 7/10,000 patient-days in 2000 to 15.8/10,000 patient-days in 2004 ($p<0.05$). A similar significant increasing trend was observed in rates of CDAD-related complications (0.1% in 2000 to 0.9% in 2004) and the total number of recurrent CDAD, CDAD outbreaks and positive *C. difficile* toxin tests reported. Increased numbers of ICPs per 250 beds were associated with decreased CDAD rates ($p=0.05$).

Conclusions: CDAD rates and CDAD-related complications increased significantly in NJ hospitals during 2000–2004 and a higher ICP:bed-size ratio was associated with lower CDAD rates in 2004. Hospitals should use these data as benchmarks to evaluate effectiveness of their infection control and prevention programs and provide adequate staffing level for infection control activities.

Keywords: *Clostridium difficile*-associated disease, *Clostridium difficile*, nosocomial infections, infection control practitioners

Poster 5
Risk Factors for Bacterial Diarrhea Among Persons with HIV Infection — United States, 1992–2003

Authors: Andrew. C. Voetsch, T. Sanchez, J. Brooks, M. Juhasz, J. Heffelfinger, A.D. McNaghten, P. Sullivan

Background: Bacterial diarrheal illness is an important cause of morbidity among HIV-infected persons. However, risk factors for bacterial diarrheal illness in this population have not been well described.

Methods: We analyzed data from CDC's Adult/Adolescent Spectrum of Disease Project, a longitudinal medical record review of persons who received HIV care in more than 100 facilities in 9 major U.S. cities from 1992 through 2003. We used logistic regression analysis to estimate the association of diarrheal illness due to an identified bacterial pathogen with mode of HIV transmission, trimethoprim-sulfamethoxazole (TMP-SMX) prophylaxis, and duration of hospitalization. Data were adjusted for age, sex, city, stage of HIV disease, antiretroviral therapy, and repeated observation of individual patients.

Results: We examined data from 46,640 persons followed up for an average of 2.6 years. A bacterial pathogen was identified in 1,139 (9.7%) of 11,789 diarrheal episodes. The most commonly identified bacterial pathogens were *Clostridium difficile* (640 episodes), *Shigella spp.* (161 episodes), and *Campylobacter spp.* (157 episodes). In multivariable analysis, bacterial diarrhea was associated with hospitalization of >30 days (odds ratio [OR]=2.2, 95% confidence interval [CI]=1.7-4.8) and with male-to-male sex as the mode of HIV transmission (OR=2.1, 95% CI=1.3-3.5). Diarrhea caused by *Clostridium difficile* was associated with hospitalization of >30 days (OR=6.1, 95% CI=2.9-12.8). Diarrhea caused by bacteria other than *C. difficile* was associated with male-to-male sex as mode of HIV transmission (OR=2.4, 95% CI=1.3-4.4) and with TMP-SMX prophylaxis (OR=2.4, 95% CI=1.3-4.6).

Conclusions: Clinicians should consider recommendations to minimize fecal-oral contact, especially for men who have sex with men, and should be aware that patients taking TMP-SMX may be at increased risk for diarrhea caused by pathogens other than *C. difficile*.

Keywords: HIV, *Clostridium difficile*, *Shigella*, diarrhea

Poster 6
Surveillance for Visitor Behavioral Risk Factors and Enteric Pathogen Shedding by Animals — South Carolina State Fair Petting Zoo, 2005

Authors: Mary A. Wenck, A. Belflower, M. L. Headrick, D. Drociuk, J. Meredith, M. Turner, S. Cox

Background: Petting zoos have been associated with outbreaks of *Escherichia coli* O157:H7. The South Carolina Department of Health and Environmental Control evaluated the petting zoo at the 2005 South Carolina State Fair for adherence to published guidelines, monitored petting zoo visitors for behavioral risk factors for enteric disease, and tested manure for enteric pathogens.

Methods: During eight 30-minute periods over 4 days, observers counted the number of visitors entering the petting zoo, monitored visitor behavior from two locations that allowed visualization of the entire venue, and observed hand-cleaning practices at the main exit. Manure was collected on three of the observation days and tested for *Salmonella* and Shiga toxin-producing *E. coli.*

Results: An average of 227 (range: 54–336) persons entered the petting zoo and 38 (range: 11–72) risky behaviors were identified during each observation period. The most common behaviors were bringing food/drink into the venue (43%), using strollers (19%), and contact with the ground (16%). Observers noted 72% (95% confidence interval = 66–77) of departing visitors washing their hands or using hand sanitizers/wipes at the main exit. Six specimens, from four of seven animal pens, tested positive for Shiga toxin; identification of the Shiga toxin-producing bacteria is pending. *Salmonella* was not identified. No cases of human illness were associated with the fair.

Conclusions: Although the petting zoo followed published guidelines, many visitors did not adhere to recommendations. Animals were documented as shedding pathogenic organisms, but the configuration of the exhibits, combined with hand-cleaning, might have been protective against human illness. Placing an attendant at the entrance to reinforce safe practices might decrease behaviors that put petting zoo visitors at risk.

Keywords: petting zoo, state fair, Shiga toxin-producing *E. coli.*

Poster 7
Multistate Outbreak of *Salmonella* Typhimurium Infections Associated with Inadequately Treated Orange Juice — United States, 2005

Authors: Seema Jain, S. Bidol, J. Lockett, E. Berl, F. Elson, M. LeMaile-Williams, M. Deasy, M. Moll, E. Gagnon, V. Rea, D. Esterle, J. Vojdani, P. Yu, M. Hoekstra, C. Braden, M. Lynch

Background: *Salmonella* causes an estimated 1.4 million illnesses and 400 deaths annually in the United States. In 2001, following several unpasteurized juice-associated outbreaks, the Food and Drug Administration (FDA) issued a Hazard Analysis and Critical Control Point (HACCP) regulation for juice processors. This regulation includes juice or citrus fruit surface treatment by pasteurization or other methods to achieve a 5-log pathogen reduction. We investigated a multistate outbreak of *Salmonella* Typhimurium (ST), the first associated with orange juice reported since the juice HACCP regulation implementation.

Methods: We defined a case as infection with ST yielding the outbreak pulsed-field gel electrophoresis pattern and illness onset after May 1, 2005. We conducted a case-control study among residents of five states. Age-group matched controls were identified through random digit-dialing. FDA conducted an onsite investigation of Company X.

Results: We identified 156 cases in 23 states. The median age was 22 years; 48% were female. Among 38 cases and 53 controls, illness was associated with consuming orange juice (90% vs. 44%, matched odds ratio [mOR] 22.2, exact 95% confidence interval [CI] 3.5 – 927.5). In a conditional logistic regression model, illness was associated with consuming unpasteurized orange juice from Company X (53% vs. 0%, adjusted mOR undefined, CI 7.1-infinity). FDA found Company X non-compliant with the juice HACCP regulation including the pathogen reduction requirement and isolated non-outbreak strain *Salmonella* from Company X's orange juice.

Conclusions: Orange juice from Company X was the vehicle of a widespread *Salmonella* outbreak. Though the route of contamination is unknown, non-compliance with the juice HACCP regulation likely contributed to this outbreak. Pasteurization or other reliable treatment of orange juice could prevent similar outbreaks in the future.

Keywords: *Salmonella* infections, fruit juice, epidemiology, disease outbreaks

Poster 8
Multistate Outbreak of *Salmonella* Typhimurium Infections Associated with Eating Ground Beef — United States, 2004

Authors: Neely Kazerouni, B. Albanese, C. E. O'Reilly, M. Lynch, D. Ferguson, A. Cronquist, S. Wedel, D. Hoang-Johnson, J. Lockett, T. Ihry, M. Sewell

Background: *Salmonella* Typhimurium (ST) is the most prevalent *Salmonella* serotype in the United States. Outbreak investigations have indicated that ground beef (GB) is a typical food vehicle for ST. In September 2004, we investigated a multistate cluster of ST infections to determine a common source.

Methods: We compared pulsed-field gel electrophoresis (PFGE) patterns of ST isolates reported to PulseNet to identify cases for inclusion in a case-control study. We defined a case as infection with ST having a PFGE pattern indistinguishable from the outbreak pattern and onset date of August 11–October 2, 2004. Age-group-matched controls were selected by sequential-digit dialing. Traceback investigation included inspection of GB processing plants.

Results: Thirty-one cases were identified in nine states and DC. Analysis included 23 case-patients with 46 matched controls. Median age of case-patients was 37 years; nine (39%) were hospitalized. Twenty-one (91%) case-patients and 37 (80%) controls reported eating GB (matched odds ratio [mOR]: 2.4; 95% confidence interval [CI] = 0.5–11.8); 10 (43%) case-patients and three (7%) controls purchased GB from chain A (mOR: 17; CI = 2.2–135); 10 (43%) case-patients and eight (17%) controls ate undercooked GB (mOR: 7.4; CI = 1.2–45). Testing of a GB sample yielded ST with a PFGE pattern indistinguishable from the outbreak pattern. Plant practices conformed to current guidelines. No products were recalled.

Conclusions: A multistate outbreak of ST caused substantial morbidity and was strongly associated with GB purchased at a national supermarket chain. Expanding the range of public health interventions available to control *Salmonella* in GB should be considered. Targeting additional interventions to various steps from beef production to consumption might help reduce the burden of salmonellosis.

Keywords: case-control study, disease outbreaks, meat, *Salmonella* food poisoning, *Salmonella* infections, *Salmonella* Typhimurium

Poster 9
Is It the Melon? Outbreak of *Escherichia coli* O157:H7 Associated with Multiple Events Served by One Caterer — Ohio, August–September 2005

Authors: Manoj P. Menon, P. Yu, E. Cartwright, S. Iames, D. Thomas, K. Baroudi, M. Joyner, M. Lynch

Background: Ground beef is the most common source of *E. coli* O157:H7 infections, though foodborne outbreaks have also been linked to beef steaks, produce, and fruit juices. We investigated an outbreak of *E. coli* O157:H7 infections in Ohio associated with seven events served by one catering company.

Methods: To conduct a case-control study we defined a case as infection with the pulsed-field gel electrophoresis defined outbreak strain of *E. coli* O157:H7 among persons who ate food served by Caterer X between August 27 and September 1, 2005 and their household contacts. Well controls were frequency matched to cases by event. We reviewed caterer kitchen practices and food supply records.

Results: We identified 17 cases with illness onset dates from August 29 to September 17, 2005. Age range of patients was 2 years to 94 years. Five patients were hospitalized; two patients developed hemolytic–uremic syndrome. One patient died. Among 12 cases and 36 controls, patients were more likely than controls to have consumed any fruit salad (11/11 (100%) cases, 17/28 (61%) controls, Matched Odds Ratio=undefined; p=0.002). One food worker was ill with onset several days after the initial case. Raw steak tips were handled in the kitchen on the same surface as fruit just before preparing the fruit salad. We identified no infections in other venues receiving fruit from the same supplier.

Conclusions: Fruit salad was associated with illness at multiple catered events. These findings suggest that fruit may have been contaminated during preparation by contact with surfaces used to prepare raw beef. This outbreak underscores the need to avoid cross-contamination between meat and ready to eat foods prepared on the same surface.

Keywords: *E.coli* infections, cross–contamination, outbreaks, fruits

Poster 10
Outbreak of *Shigella flexneri* Serotype 2a at a Golf Tournament — Maine, 2005

Authors: Araceli Rey, K. Sinclair, V. Rea, A. Yartel, K. Gensheimer

Background: Shigellosis is diarrheal illness requiring few organisms for transmission. During 2000–2004, in Maine, an average of nine shigellosis cases/year was reported. On September 12, 2005, the Maine State Health Department identified a cluster of ≥11 persons who became ill after participating in a golf tournament on September 1. We conducted an investigation to determine the magnitude of the outbreak and to implement control measures.

Methods: We conducted a cohort study by interviewing persons who attended the event. A case was defined as ≥3 diarrhea episodes during a 24-hour period in an attendee, ≤4 days after the event. We collected stool samples and performed an environmental inspection of affected establishments. No food items from the event were available for testing.

Results: We identified 128 attendees and interviewed 117 (91%). Forty-nine persons met the case definition (attack rate: 42%). Illness onsets occurred during September 2–6. The most common symptoms reported were diarrhea (100%), bloody stool (39%), and vomiting (27%). Eighteen (37%) patients sought medical care; one was hospitalized. Four stool specimens were positive for *Shigella flexneri* 2a and had indistinguishable patterns when tested by using pulsed field gel electrophoresis. The dinner buffet at the event demonstrated a significant association with illness (relative risk [RR]: 17.6; 95% confidence interval [CI]=1.1–273.3). The only buffet item significantly associated with illness was the beef skewer (RR: 4.5; 95% CI=1.2–16.8). Both the country club and caterer were identified as having deficiencies on environmental inspection.

Conclusions: The most likely cause of this outbreak was the beef skewer served during the buffet. Prompt diagnosis and reporting is essential in determining the source of contamination and implementing control measures.

Keywords: *Shigella*, outbreak, foodborne illness, diarrhea, Maine

Poster 11
Aspergillus-Associated Outbreak of Prosthetic Valve Endocarditis — Colorado, 2005

Authors: Lauren A. Burwell, S. Benoit, A. Srinivasan, J. Noble-Wang, M. Arduino, M. Brandt, R. Meinberg, K. Gershman, W. Bamberg, S. Fridkin

Background: In the United States, more than 60,000 prosthetic valve surgeries are performed annually to replace failing heart valves. Infection of the replaced valve, or prosthetic valve endocarditis (PVE), is rare. PVE due to moulds, like *Aspergillus*, is extremely rare (0.1% of patients). Two patients had prosthetic valve surgery in March 2005 in the same operating room and developed *Aspergillus* PVE. We investigated this outbreak to determine the source of these infections.

Methods: A case had prosthetic valve surgery at Hospital A from February 1 through April 15, 2005 and developed *Aspergillus* endocarditis. To ascertain cases, we interviewed staff at Hospital A and reviewed laboratory data at 19 metropolitan area hospitals. Patients who had surgery within two months of the cases were clinically evaluated and had serologic testing for *Aspergillus*. A cohort study of these patients was performed. Intra-operative and peri-operative data were compared between cases and non-cases by Fisher's exact or Wilcoxon test.

Results: Two cases were identified; one was diagnosed four months after surgery, one was diagnosed seven months after surgery and died several days later. Cases' valves were from different manufacturers. No additional cases were identified. Both cases had surgery in an operating room adjacent to an area under construction; some barriers to prevent construction-related exposure were intermittently compromised. The cohort study included 19 patients. Case-status was associated with use of vascular adhesive during surgery (RR 16, $p<0.05$) or surgery that replaced a portion of the aorta in addition to the prosthetic valve (RR 21, $p<0.05$).

Conclusions: Construction adjacent to the operating room was likely the source of exposure. However, procedure-specific factors may have facilitated infection.

Keywords: Aspergillus, endocarditis, heart valve prosthesis, hospital design and construction

Poster 12
Outbreak of Human Adenovirus 3 Infection in a Pediatric Chronic-Care Facility — Illinois, 2005

Authors: Lyn James, M.O. Vernon, R.C. Jones, A. Stewart, X. Lu, L.M. Zollar, M. Chudoba, M. Westercamp, G. Alcasid, L. Wood, S. Boonlayangoor, C. Bethel, K. Ritger, C. Conover, D. Erdman, S.I. Gerber

Background: Human adenovirus 3 (HAdV-3) causes severe respiratory illness among children, but outbreaks in chronic-care facilities have not been frequently reported. We describe an outbreak of HAdV-3 infection in a chronic-care facility for children with severe neurologic impairment, where only three of 63 residents were ambulatory.

Methods: A case was defined as fever (>100.4°F) and a worsening of respiratory symptoms or conjunctivitis in a resident, with illness onset May 15–September 9, 2005. We reviewed medical records; conducted surveillance for fever, conjunctivitis, and respiratory symptoms; and collected nasopharyngeal and conjunctival specimens from symptomatic residents. Specimens were cultured in HAdV-permissive cell lines or were analyzed by HAdV-specific polymerase chain reaction (PCR) assay.

Results: Thirty-six (57%) of 63 residents had illnesses that met the case definition; the first was identified on June 1 and the last on August 24. Thirty-three (92%) patients had respiratory infections and three (8%) had conjunctivitis. Median age was 7 years (range: 7 months–18 years). Thirty-three (92%) patients had tracheostomies and 20 (56%) were ventilator-dependent before the outbreak. Eighteen (50%) patients were admitted to intensive-care units, and three (8%) died. Total patient-days in intensive care was 252. Residents on ventilators were 2.2 times (95% confidence interval=1.4–3.3) more likely to meet the case definition than residents not on ventilators. HAdVs were identified by culture or PCR in 20 case-patients. Nine isolates were characterized as HAdV-3 genome type a2.

Conclusions: This outbreak was caused by HAdV-3 genome type a2. Underlying neurologic conditions contributed to severe morbidity and mortality. Considering the limited mobility of residents and their reliance on respiratory care, transmission to residents likely occurred through respiratory care provided by staff.

Keywords: outbreak, adenoviruses, pediatrics

Poster 13
Outbreak of *Rhizopus arrhizus* Associated with Ileostomy Care After Abdominal Surgery — Ohio, 2005

Authors: Mysheika LeMaile-Williams, L. Burwell, D. Salisbury, S. Iiames, M. Brandt, J. Noble-Wang, T. Lott, A. Srinivasan, S. Fridkin

Background: Annually, >70,000 abdominal stoma operations are performed in the United States and Canada. Colostomy and ileostomy are the most common types; postoperative infections are rare. *Rhizopus arrhizus* is a mold that causes mucormycosis, a rare fungal infection that occurs primarily among immunocompromised persons. In April 2005, cases of *R. arrhizus* among ostomy patients were reported by Hospital A. We investigated to determine the source of infection and prevent further cases.

Methods: A case was defined as any Hospital A patient with a new stoma placed during January–April 2005 (study period) and with laboratory-confirmed mucormycosis. We reviewed Hospital A laboratory data, conducted national e-mail queries for case finding, and collected environmental samples of ostomy supplies and hospital areas. A cohort study was performed of new colostomy and ileostomy patients during the outbreak period; perioperative and postoperative data were compared between case and noncase groups by using Fischer's exact or Wilcoxon tests.

Results: Of 21 patients in the cohort, two were case-patients (9.5%). Six patients receiving an equivalent of 0.5 mg/kg/day of prednisone for >7 days before infection were more likely to be case-patients (33%) than other patients (0%; $p = 0.07$). Affected patients were more likely to have their first ostomy bag changed >7 days postsurgery (relative risk undefined; $p = 0.002$). *Rhizopus* spp. was not recovered from Hospital A's environment but was recovered from 10/18 (55%) karaya (plant-derived adhesive) ring ostomy bags.

Conclusions: This investigation indicates prolonged exposure to karaya ostomy bags was the source of *R. arrhizus* infections among susceptible hosts. Health-care staff should be aware that exposure to karaya-based products can be a risk factor for Rhizopus infection.

Keywords: mold, ostomy, karaya, infections

Poster 14
Outbreak of Systemic Inflammatory Response Syndrome Linked to a Compounding Pharmacy — Virginia, 2005

Authors: Ami S. Patel, D. Woolard, L.C. McDonald, L. Dewey, J. Noble-Wang, T. Forster, J. Armitage, G. Gotshall, D. Stern, M.B. White-Russell

Background: Systemic inflammatory response syndrome (SIRS) is a serious condition that can result in death. During August 31–September 7, 2005, three persons presented with SIRS without sepsis after coronary artery bypass graft surgery (CABG) at Hospital A. The cluster was investigated to identify potential causes.

Methods: Practices and procedures during CABG were reviewed. Solutions used during surgery were tested by Hospital A and CDC for bacterial contamination and endotoxin. A case-series evaluation was conducted by abstracting surgical information on patients at Hospital A who had had a SIRS response <24 hours after CABG during December 29, 2004–September 7, 2005.

Results: Eight male and three female patients were identified, including the three patients comprising the cluster and eight earlier patients. Unopened bags from two of three lots of cardioplegia solution used during the week of the SIRS cluster were contaminated with multiple species of gram-negative bacilli and endotoxin. The solution had been prepared in a compounding pharmacy (Pharmacy X) that served hospitals in Virginia, Maryland, and Washington, DC. The procedures review did not reveal any other likely source of contamination. Epidemiologic links between the cluster and earlier patients were not established.

Conclusions: After this investigation, Pharmacy X was investigated by the Food and Drug Administration. A voluntary recall of all their injectable products, including cardioplegia solution, was undertaken. No other hospitals using Pharmacy X reported any SIRS clusters. These results highlight how contamination of compounded medications might unknowingly occur during preparation. Hospitals increasingly rely on compounding pharmacies, with varying levels of quality control, to produce sterile medications. More stringent policies for regulating compounding pharmacies might be necessary to prevent future cases.

Keywords: systemic inflammatory response syndrome, pharmacy, cardioplegia

Poster 15
It's in the Bag: A Multistate Outbreak of *Serratia marcescens* Bloodstream Infection Associated with Contaminated Intravenous Magnesium Sulfate from a Compounding

Authors: Rebecca H. Sunenshine, E. Tan, S. Kazakova, D. Terashita, B. Jensen, J. Noble-Wang, E. Bresnitz, C. Tan, L. McDonald, SM BSI Investigation Team

Background: Despite generally lower quality control standards than pharmaceutical manufacturers, compounding pharmacies are increasingly utilized by hospitals as a source of parenteral medications. In January and March 2005, CDC received reports of *S. marcescens* (SM) bloodstream infection (BSI) in cardiac surgery patients from Los Angeles (LA) County and New Jersey (NJ) health departments, respectively. We investigated the cause of these outbreaks.

Methods: Environmental sampling and a matched case-control study were conducted in LA. *SM* BSI cases were matched to controls by unit and time. Case record review and environmental testing were conducted in NJ. Multi-state case-finding was performed; isolates were compared using pulsed-field gel electrophoresis (PFGE).

Results: Nationally distributed magnesium sulfate (MgSO4) produced by Pharmacy X was the only significant risk factor for *SM* BSI (OR=6.4, CI=1.1-38.3) among six LA cases and 18 controls. Environmental testing in LA yielded no evidence of *SM*. Five NJ case-patients received MgSO4 from a single lot produced by Pharmacy X; *SM* was cultured from open and unopened 50-ml bags in this lot. Seven additional cases from three different states were identified. Clinical isolates from all 18 case-patients and those obtained from MgSO4 demonstrated indistinguishable PFGE patterns. Pharmacy X voluntarily recalled all 50-mL bags of product. The Food and Drug Administration identified no source of contamination in their investigation of Pharmacy X.

Conclusions: A multi-state outbreak of *SM* BSI was linked to contaminated MgSO4 produced by Pharmacy X. CDC recommended that no MgSO4 from Pharmacy X be administered to patients. Healthcare personnel should be aware of the potential for intrinsic contamination of parenteral medications produced by compounding pharmacies and the extensive adverse impact on patient safety that may result.

Keywords: drug compounding, *Serratia* infections, bacteremia, magnesium sulfate

Monday, April 24, 2006
Session C: Swim, Don't Swallow: Waterborne Disease
Grand Ballroom
1:30 p.m.–3:00 p.m.
Moderator: Michael Beach

Outbreak of Leptospirosis Among Adventure Race Participants — Tampa, Florida, 2005
1:35 p.m.

Authors: Eric J. Stern, D. Gross, S. Reagan, M. Ari, P. Wilkins, L. Harris, R. Galloway, K. Wannemuehler, T. Wofford, D. Atrubin, K. Granger, T.A. Clark

Background: Extreme sports are gaining popularity, and exposure to environments contaminated by animal urine puts athletes at risk for leptospirosis, a bacterial zoonosis of worldwide distribution with 10% case-fatality. Recently, several large leptospirosis outbreaks have occurred following extreme sporting events. On November 21, 2005, a 32 year-old male New York resident was hospitalized with suspected leptospirosis. He participated in an endurance-length swamp race on November 4-5, 2005 in Florida.

Methods: We interviewed racers to assess illness, medical care, and race activities. A suspect case was defined as fever plus two or more of the following symptoms occurring after November 4, 2005: headache, chills, sweats, muscle aches, eye pain, red eyes, dark urine or unusual bleeding. Suspect case-patients were referred for treatment as needed, and asked to submit serum for microagglutination testing. A titer of > 400 in a single specimen confirmed leptospirosis.

Results: We interviewed 192 (96%) of 200 racers from 32 states and Canada; 43 (22%) met the suspect case definition and 12 were confirmed. Median age was 37 years (range 19-66) and 128 (66.7%) were male. Factors associated with increased risk of leptospirosis included swallowing river water (Odds Ratio [OR] 3.4, 95% Confidence Interval [CI] 1.6-7.0), swallowing swamp water (OR 2.4, 95% CI 1.1-5.2) and being submerged in water (OR 2.3, 95% CI 1.1-4.7). Having severe cuts on the legs and wearing shorts during the race were not associated with increased risk of infection.

Conclusions: The outbreak described resulted in a high rate of symptomatic infection. In the absence of modifiable risk factors, targeted chemoprophylaxis should be considered to reduce the risk of leptospirosis in future events.

Keywords: leptospirosis, outbreaks, swimming, adventure Race

Two Fatal Cases of Primary Amebic Meningoencephalitis — Oklahoma, August 2005
1:55 p.m.

Authors: Sara J. Russell, J. Bos, B. Cauthen, G. Visvesvara, D. John, L. Xiao, S. Soltow

Background: Primary amebic meningoencephalitis (PAM) is a rare but nearly always fatal illness, typically associated with exposure to natural bodies of fresh water and rarely associated with a maintained water system. We investigated two fatal cases of PAM among children that occurred in one city during the same week, to determine possible etiologic links between the patients and to institute control measures.

Methods: We interviewed close contacts of the children regarding possible water exposures. All potential exposures were evaluated, including maintenance records and system design on any maintained water systems. Brain tissue and water samples were collected to culture for presence of *Naegleria fowleri.*

Results: Culture and polymerase chain reaction (PCR) results from brain tissue confirmed *Naegleria fowleri* type-1 in both children. One child had multiple natural water exposures and had attended an interactive water park. The other child's only confirmed exposure was attendance at the same water park. On the days the children attended the water park, chlorine levels were ≤0.5 ppm and water temperature was >90° F. In addition to the common water park exposure, both children lived within 1 mile of the same stream. Cultures of all water sources were negative for *Naegleria fowleri*.

Conclusions: The geographic and temporal clustering of the patients indicates a point source for infection. Although the more likely exposure for PAM would be a natural water source (i.e., stream), we cannot rule out the water park due to the insufficient chlorine levels. Education on PAM prevention, enforcement of recreational water safety regulations, and design modifications (i.e., automatic shutoff when chlorine levels are <1 ppm) could reduce the likelihood of transmission of waterborne pathogens such as *Naegleria fowleri.*

Keywords: primary amebic meningoencephalitis, water park, Oklahoma

Fountain of Fever: An Unexpected Source in a Community Outbreak of Legionnaires' Disease — South Dakota, 2005
2:15 p.m.

Authors: Rosalyn E. O'Loughlin, L. Kightlinger, M. Werpy, E. Brown, V. Stevens, C. Hepper, T. Keane, J.E. Stout, K. Wilson, B. Fields, M.R. Moore.

Background: Legionnaires' disease (LD) is a severe form of pneumonia spread by contaminated aerosol sources. Up to 18,000 cases occur annually in the U.S. From May to October 2005, 18 cases of LD were reported in Rapid City, South Dakota. We conducted epidemiologic and environmental investigations to identify and contain the outbreak's source.

Methods: We interviewed all case-patients and conducted a case-control study that included the first 13 cases and 52 controls matched on underlying illness. Controls were randomly selected from hospital emergency department records. All activities of case-patients and controls during the 14 days before symptom onset were recorded. Environmental samples (n=300) from 134 potential sources at 73 Rapid City sites were cultured for *Legionella*. Clinical and environmental isolates were compared using monoclonal antibody subtyping.

Results: Case-patients were significantly more likely than controls to have passed through three city areas close to cooling towers positive for *Legionella* (matched odds ratio [mOR] 6.5, 95% CI 1.3-65.4, mOR 12.0, 95% CI 1.3-597, mOR 12.1, 95% CI 1.5-558). Six (55%) of 11 (mOR 32.7, 95% CI 4.7-∞) case-patients reported eating in Restaurant A versus 0 controls. *Legionella pneumophila* serogroup 1 was isolated from four clinical specimens: 3 were Benidorm strain and 1 was the rare Denver strain. *Legionella* were identified from several sites including 24 (55%) of 44 cooling towers tested, but only one site, a small decorative fountain in Restaurant A, contained the Benidorm, outbreak strain. No cases occurred after removal of the fountain.

Conclusions: This is the first report to document a decorative fountain in a restaurant as the source of a Legionnaires' disease outbreak. Access to clinical isolates was critical for source identification.

Keywords: Legionnaires' disease, decorative fountain, community outbreak

Outbreak of Norovirus Gastroenteritis Among River Rafters — Grand Canyon, 2005
2:35 p.m.

Authors: Mark A. Malek, E. Barzilay, A. Kramer, B. Camp, C. Higgins, L.-A. Jaykus, L. Williams, M. Gaither, S. Boone, J. Barajas, M. Lynch, M.-A. Widdowson

Background: Noroviruses, the most common cause of gastroenteritis, are often transmitted by point-of-service contamination of food. In September 2005, we investigated reports of gastroenteritis among Colorado River rafters to identify the agent and source of infection and measures to prevent future outbreaks.

Methods: We surveyed all companies that launched rafting trips from August 19 to September 12 and conducted a case-control study, using a standardized questionnaire, of trips reporting three or more ill rafters. Case-patients were defined as persons with diarrhea or vomiting within 48 hours after trip launch; controls were persons not ill within 72 hours. We tested stool and food specimens for norovirus by polymerase chain reaction, using novel laboratory methods. We performed a traceback of the suspected food vehicle and inspected the implicated processing plant.

Results: Twelve (13%) of 91 trips reported three or more cases of gastroenteritis. Fifty-seven case-patients (96%) and 95 controls (79%) reported eating deli meat (odds ratio=7.3, 95% confidence interval=1.7–66.7). All deli meat served on trips with illness was purchased from one processing plant, where a foodworker had sliced meat with bare hands one day after recovering from gastroenteritis. The meat was vacuum-packed and frozen at -23ºC for 7–28 days prior to consumption. Norovirus was detected in two of five sealed frozen meat packages and in two of three stool specimens from case-patients on three different trips; genetic sequencing data are pending.

Conclusions: This is the first norovirus outbreak confirmed to be caused by contaminated commercially packaged food. Application of a novel laboratory assay to detect norovirus in the implicated food confirmed the epidemiologic link. Proper handling during food processing is necessary to prevent norovirus transmission.

Keywords: norovirus, gastroenteritis, Grand Canyon, outbreak

Monday, April 24, 2006
Session D: Workin' Hard for the Money: Occupational Illness and Injury
Grand Ballroom
3:15 p.m.–5:30 p.m.
Moderator: Donald Millar

There's a Fungus Among Us: Knowledge, Attitudes, and Practices of Residents and Remediation Workers Regarding Mold — New Orleans, Louisiana, October 2005
3:20 p.m.

Authors: Kristin J. Cummings, D. Van Sickle, C. Rao, M. Riggs, C. Brown, J. Ferdinands, R. Moolenaar

Background: In the United States, 20 million people have asthma, causing 2 million emergency department visits and 5,000 deaths annually. Mold exposure is associated with asthma exacerbations and other respiratory illnesses. Following Hurricane Katrina, extraordinary mold growth occurred in many New Orleans buildings, generating widespread concern about health effects. We conducted a survey of knowledge, attitudes, and practices regarding mold to guide interventions.

Methods: We interviewed residents (N=159) at public sites in flooded communities, including a Disaster Recovery Center and home improvement store, and remediation workers (N=76) at these same locations, plus worksites, campsites, and gathering places. We interviewed Spanish-speakers in Spanish. We analyzed responses regarding perceptions of mold and health, protective equipment use, and suggested modes of post-disaster communications.

Results: Of residents, 153 (96%) thought mold causes illness and 108 (68%) correctly identified particulate-filter respirators as appropriate respiratory protection. Sixty-seven (42%) participated in mold remediation; of these, 46 (69%) didn't always use appropriate respirators. Reasons included discomfort and lack of availability. For public communications, 139 (87%) recommended television and/or radio. Of workers, 40 (53%) spoke only Spanish. Seventy-two (95%) thought mold causes illness and 65 (86%) correctly identified particulate-filter respirators. Sixty-nine (91%) participated in mold remediation. Of these, 34 (49%) weren't fit-tested and 24 (35%) didn't always use appropriate respirators, often citing discomfort. For worker communications, 36 (47%) recommended television and/or radio and 17 (22%) employers.

Conclusions: Despite awareness of health risks, respondents didn't consistently identify or use appropriate respiratory protection seven weeks post-disaster. Communications about mold should emphasize particulate-filter respirators and interventions should assure their availability. Television, radio, and employers should be used for communications, with workers' messages delivered in English and Spanish.

Keywords: hurricanes, floods, molds, asthma, air-purifying respirators

Evaluation of a System for Surveillance for Pneumonia Among Health-Care Workers — Maryland, 2005
3:40 p.m.

Authors: Gita G. Mirchandani, K. Tolson, D. Rohn, M. Davenport, D. Blythe, J. Blair

Background: Newly emergent respiratory infections, including severe acute respiratory syndrome and avian influenza A, can be severe among humans, resulting in pneumonia and hospitalizations. Because health-care workers (HCWs) are at increased risk from patient contact, early detection of pneumonia cases among HCWs can serve as sentinel events for the emergence of new pathogens. We evaluated two attributes of Maryland's surveillance for pneumonia among HCWs, system timeliness and the completeness of pathogen reporting.

Methods: We analyzed surveillance data for October 2003–October 2005. Cases were defined as pneumonia confirmed by chest radiograph or computed tomography in a hospitalized HCW. We assessed completeness of pathogen reporting by reviewing case-report forms, and timeliness by computing the mean delay in reporting time.

Results: During the 2 years the system has been operating, 74 HCWs meeting the case definition were reported; complete information was available for 58 of these. Of these 58 cases, 81% were female. Median age was 47 years (range: 19–78). Fifty percent were nurses. No outbreaks or emerging pathogens were detected. Laboratory confirmation of a causative organism for pneumonia was available in approximately 26% of cases. Mean delay between date of admission to a hospital and reporting of a case to the local health department was 4.2 days (median: 2 days; range: 0–65 days).

Conclusions: Surveillance for pneumonia among HCWs can provide timely and useful information; moreover, a shorter delay between hospitalization and reporting might enhance early detection of clusters. Improved pathogen identification will allow for more targeted public health interventions.

Keywords: influenza, avian influenza, pneumonia, health-care worker, surveillance

Outbreak of Building-Related Symptoms — Wisconsin, 2005
4:00 p.m.

Authors: Arthur M. Wendel, M. Chamberlain, H. Anderson

Background: Building-related symptoms (BRS) influence absenteeism, work performance, and health-care costs; BRS are estimated to reduce U.S. worker productivity by $20–$50 billion annually. In late 2005, we investigated a Wisconsin office building where a cluster of physician-reported allergic reactions were occurring.

Methods: We examined the building and surveyed all 49 employees. We defined a case of BRS as three or more currently-reported symptoms in an employee that indicated mucus membrane irritation, respiratory problems, fatigue, difficulty concentrating, or headache; worsened while in the building; and present for >3 months. We visually inspected the building and heating, ventilation, and air conditioning (HVAC) system. Carbon dioxide, humidity, dew point, carbon monoxide, and temperature levels were measured.

Results: Forty-two employees completed questionnaires (85.7%). We identified 20 (48%) cases of BRS. In 13 (31%) cases, BRS interfered with daily functioning, and in 15 (36%), the employee sought medical attention. Commonly reported symptoms included fatigue (n=16), eye irritation (n=15), and nasal discharge (n=10). We identified no significant differences in BRS prevalence by profession; prevalence ratios ranged from 1.5 (95% confidence interval [CI]=0.80–2.72) among social workers to 0.5 (95% CI=0.09–2.81) among clinical employees. Six HVAC units supplied the office; BRS prevalence did not vary by unit (p=0.77). Carbon dioxide levels were elevated (>1,000 ppm) in 10 of 35 offices, indicating inadequate ventilation. Building inspection revealed recent roof leaks, dusty fiberglass-lined ventilation ducts, and water intrusion in the basement.

Conclusions: Approximately half the workers in this building, from different offices and professions, reported BRS. Building inspection revealed multiple ventilation and water-leakage problems throughout the structure. Ventilation improvements and water control in this building should improve worker health and productivity.

Keywords: building-related symptoms; sick building syndrome; heating, ventilation, and air conditioning (HVAC); mold; carbon dioxide; Wisconsin

Cluster of Rash Illness Among Construction Workers After Hurricane Rita — Louisiana, 2005
4:20 p.m.

Authors: L. Hannah Gould, E. Lederman, A. Cohen, R. Noe, H. Alsdurf, S. Norton, J. Morgan, J. Mott

Background: Following Hurricane Rita, construction workers at a naval air station in Louisiana presented to a local hospital with severe pruritic rash. The workers were housed in a facility that had sustained extensive flooding during the hurricane, and concern for an infectious etiology was raised.

Methods: We interviewed all employees housed at the construction site to collect demographic information and exposure histories, including occupation and contact with animals and arthropods. A case was defined as self-reported rash at the time of interview. Employees meeting the case definition were examined by the team's dermatologist, and skin biopsies were obtained for histopathologic examination. We performed a retrospective cohort study to evaluate the potential association between illness and selected exposures.

Results: Overall, 58 (43%) of 136 interviewees reported rash. The median age of patients was 34, all were male, and 41% were Native American. Forty-one patients were examined, and four distinct clinical entities were clinically diagnosed and confirmed by histopathology: papular urticaria (arthropod bites) (n=27), bacterial folliculitis (n=8), fiberglass dermatitis (n=6), and brachioradial photodermatitis (n=2). Development of skin disease was significantly associated with being a roofer (RR=1.6, p=0.0013). Papular urticaria was significantly associated with Native American heritage (RR=2.2, p<0.02) and being housed in specific wooden shelters (RR=3.5, p=0.001).

Conclusions: Although four distinct clinical entities were diagnosed in construction workers at the naval air station following Hurricane Rita, papular urticaria was most common and may be explained by a flood-related mite infestation of wooden shelters. Recommended public health interventions for mite infestations include rodent and bird control, cleaning and disinfection of furniture and bedding, and the use of acaricides.

Keywords: pruritus, hurricanes, occupational dermatitis, skin diseases, arthropods

Risk for Tuberculosis Among Staff at a Nairobi Hospital: The Price of Serving the Community — Kenya, 2005
4:40 p.m.

Authors: Shona Dalal, T. Galgalo, K. Cain, J. Oeltmann, N.N. Bock, C. Tetteh, B.I. Miller, R. Breiman, K. DeCock, K. Ijaz.

Background: In sub-Saharan Africa the dual pandemics of tuberculosis (TB) and HIV infection pose a serious threat for occupationally acquired TB among health care workers. Reports of elevated rates of TB in staff of an 1,800 bed hospital in Nairobi, Kenya, led to an investigation to characterize the epidemiology of TB in this setting.

Methods: We conducted a case-control study to determine workplace factors associated with TB disease among hospital employees. Cases were all staff members diagnosed with TB from January 2003 to September 2005. Controls were randomly selected from the current staff listing of 4,833 with no history of TB disease. Multivariate logistic regression was used to calculate associations.

Results: We interviewed 65 cases and 316 controls. Median age and sex were similar among cases and controls. Among those who knew their HIV status, HIV infection was reported in 12 (27%) of 45 cases and 2 (1%) of 165 controls. Multivariate analysis indicated that factors independently associated with TB disease among staff included: >5 hours of patient contact per day (adjusted odds ratio [aOR] 6.5, 95% confidence interval [CI] 2.3-18.4), work in areas where TB patients receive care (aOR 2.2, 95% CI 1.1-4.4), HIV infection (aOR 33, 95% CI 5.7-192), and living in a slum (aOR 4.0, 95% CI 1.4-11.2).

Conclusions: We documented that hospital exposures and HIV status were associated with TB disease among staff at this Nairobi hospital. To protect health care workers, health care facilities should decrease potential TB transmission by improving early detection and treatment of TB cases, maximizing effective ventilation, encouraging staff testing for HIV, and offering optional reassignment for HIV-infected staff away from areas of high TB exposure.

Keywords: tuberculosis, HIV, hospital–associated transmission, health-care worker, staff

Roofers: At Risk for Silicosis — Arizona, 2005
5:00 p.m.

Authors: Judith Eisenberg, E. Page, C. Mueller, R. Sollberger, R. Hall

Background: Each year 2.2 million workers are exposed to respirable silica dust, increasing the risk of silicosis—a disabling, irreversible lung disease. In Arizona in 2004, NIOSH investigators documented overexposure to respirable silica among roofers dry cutting cement roofing tiles. This was the first time respirable silica overexposures were documented in the roofing industry, and provided an opportunity to examine the association between exposure and potential adverse health effects.

Methods: As part of a NIOSH Health Hazard Evaluation union request, workers (n=120) from four Phoenix roofing contractors completed a questionnaire, spirometry, and chest x-ray. Workers included were identified by job title; duration of employment as a roofer was used as a marker of exposure to respirable silica. Linear regression was used to examine the relationship between spirometry outcomes and exposure.

Results: Participants were male, primarily Hispanic (92%), 19 to 58 years. The maximum duration of employment was 27 (range 0-27) years. Fifteen percent had abnormal spirometry results. A significant inverse relationship was found between duration of employment and percent predicted forced expiratory volume at one second (FEV1) ($p < 0.05$), after controlling for age and smoking. Percent predicted FEV1 decreased by 0.6% for every year of employment. Chest x-rays showed no evidence of nodular opacities in shape, size, or profusion consistent with silicotic changes.

Conclusions: Roofers cutting cement tiles were at risk for silicosis. Subclinical decrement in lung function with increasing duration of employment may be an indicator of silica exposure. NIOSH is working with roofers unions and contractor associations to develop engineering controls, implement Occupational Safety and Health Administration (OSHA) guidelines to protect and monitor roofers exposed to respirable silica and educate the roofing industry.

Keywords: respirable silica, silicosis, roofer, spirometry

Tuesday, April 25, 2006
Concurrent Session E1:
What? You're Still Sick?: Chronic Disease
Grand Ballroom
8:30 a.m.–10:15 a.m.
Moderator: Janet Collins

Weight-Loss Attempts Among Obese Adults — United States, 1999–2002
8:35 a.m.

Authors: Carolyn J. Tabak, C. Ogden

Background: Obesity costs society more than $117 billion annually and is strongly associated with other chronic diseases such as diabetes. Although successful weight-loss may require several attempts, obese individuals who lose even small amounts of weight may prevent onset of these complications. However, it is unclear what effect health-care professionals may have on their patients' weight-loss. We identified the association between being told by a doctor that one is overweight and weight-loss attempts among obese individuals.

Methods: Nationally representative data from 2465 obese adults (aged 20+ years) who participated in the National Health and Nutrition Examination Survey between 1999-2002 were analyzed. Descriptive statistics were calculated on those who attempted weight-loss, and multivariate logistic regression was performed to model the association of being told by a doctor that one was overweight with weight-loss attempts in the past year. Covariates for age group (20-39, 40-59, and 60+ years), race/ethnicity (Mexican-American, non-Hispanic black and white), sex, and whether participants considered themselves overweight were included. We tested for interactions between covariates.

Results: Overall, 57% of obese adults told by a doctor they were overweight tried to lose weight in the previous year. Obese individuals told by their doctor they were overweight were more likely to attempt weight-loss (Adjusted Odds Ratio [AOR] 1.3, 95% confidence interval [CI] 1.1-1.7), as were obese females (AOR 1.4, 95% CI 1.1-1.8) and those who considered themselves overweight (AOR 4.9, 95% CI 3.0-8.2). There were no significant effects by age or race/ethnicity, and no interactions were found.

Conclusions: Obese individuals told by a doctor they are overweight are more likely to attempt weight-loss. Therefore, discussing obesity with patients could positively influence their attempts at weight-loss.

Keywords: obesity, overweight, health professionals, weight-loss

Disparities Among Persons with Diabetes-Related Amputations Along the Texas-Mexico Border — 2003
8:55 a.m.

Authors: Eric A. Miller, P. Huang

Background: The estimated prevalence of diabetes among U.S. adults residing along the U.S.-Mexico border is approximately double the prevalence nationwide. In Texas, access to care and preventive services along the border is inadequate and might contribute to higher rates of diabetes-related amputations and substantial economic costs. We compared rates and costs of hospitalizations for diabetes-related amputations among persons residing along the border with nonborder counties in Texas to examine the potential excess burden.

Methods: Border counties were defined as the 32 Texas counties within 100 km of the Texas-Mexico border. Nontraumatic diabetes-related amputations and corresponding charges were identified from the 2003 Texas Public Use Data File, which includes demographic, diagnostic, and administrative information for inpatient hospital discharges. Denominators were determined by using 2003 Texas population data and the 2003 Behavioral Risk Factor Surveillance System to estimate the number of persons with diabetes. Rates and rate ratios (RR) comparing border and nonborder counties were calculated overall, age-adjusted to the 2000 U.S. population, and stratified by age groups.

Results: The age-adjusted rate of amputations among persons with diabetes was higher in border counties (6.1/1,000; 95%CI=5.9–6.3), compared with nonborder counties (3.7/1,000; 95%CI=3.6–3.8). The greatest disparity in rates was for those persons aged 45–64 years (RR=2.2; 95%CI=2.0–2.4). Total charges for amputations among border residents with diabetes were 20% ($49 million) of all diabetes-related amputations in Texas, whereas the border population comprises only 10% of the state.

Conclusions: Diabetes-related amputation rates are higher along the border and a source of disproportionate and substantial cost to Texas. Improving access and use of preventive care can help reduce the burden.

Keywords: diabetes, amputation, hospitalization, hospital charges

Mobility Limitation and Peripheral Arterial Disease (PAD) — United States, 1999–2002
9:15 a.m.

Authors: Min Tao, M.S. Eberhardt, S. Saydah, R. Paulose

Background: Mobility limitation is a significant health problem among older adults in the U.S., effecting 9.5 million Medicare enrollees. Elders with mobility limitation have a significantly higher likelihood for institutionalization and death than those who are mobile. With aging of the U.S. population, health and economic burdens caused by mobility limitation have become a concern. Limited clinical studies have reported that PAD was associated with or predicator for mobility limitation. Prevalence of PAD is 4.5% in the U.S. population ≥ 40 years. This study examines the association between mobility limitation and PAD using a nationally representative sample of adults.

Methods: We analyzed data from the National Health and Nutrition Examination Survey (NHANES) 1999—2002. Mobility limitation was assessed using a face-to-face standard interview. PAD was defined as ankle/brachial blood pressure index (ABPI) < 0.9, which was measured for adults aged ≥ 40 year during the NHANES medical examination. Logistic regression was used to estimate the association between mobility limitation and PAD while controlling for sociodemographic variables, medical history of other chronic conditions and smoking status.

Results: After controlling for previously identified covariates, PAD was strongly associated with mobility limitation. As the severity of PAD increased, the odds of mobility limitation increased as well. Compared with normal adults whose ABPI ≥0.9, those with ABPI between 0.7-0.9 had 2.32-fold (95%CI [1.47-3.66]) increase in the odds of mobility limitation. ABPI between 0.5-0.7 was associated with 4.53-fold (95%CI [1.89-10.82]) increase in the odds of mobility limitation.

Conclusions: The results demonstrate the strong association between PAD and mobility limitation. Future research is needed to evaluate the possibility and effectiveness of preventing mobility limitation through reducing PAD in the U.S. population.

Keywords: mobility limitation, peripheral arterial disease, health survey, adults

Oral Cancer Incidence and Survival — Washington, DC, 1997–2002
9:35 a.m.

Authors: Sukhminder K. Sandhu, T. Coté, J. Davies-Cole, A. Adade, E. Finn, G. Lum, G. Siaway, B. Laurence, O. Kassim

Background: Approximately 30,000 new cases of oral cancer are diagnosed yearly in the United States. Nationally, incidence rates are higher among black males. Oral cancer incidence, stage at presentation, and survival rates in DC and how they compare with other U.S. registries remain unpublished.

Methods: The DC Cancer Registry and the Surveillance, Epidemiology, and End Results-Nine Registry (SEER-9) were used to identify oral cancers in DC and select U.S. regions, respectively. Squamous cell histology cases were selected for 1997–2002. Age-adjusted incidence rates with 95% confidence intervals (CI) were estimated and compared between the two registries. DC oral cancer cases were mapped geographically.

Results: During 1997–2002, a total of 419 and 13,109 oral cancer cases were recorded in DC and SEER-9, for age-adjusted incidence rates of 12.6 cases/100,000 person-years and 8.6 cases/100,000 person-years, respectively. DC rates were significantly higher than collective SEER-9 rates (risk ratio [RR]=1.5; 95% CI=1.4–1.6) and each SEER-9 region. Black males in DC had the highest rate of oral cancer, 29.1 cases/100,000 person-years, a rate significantly higher than among black males in SEER-9 (RR=1.8; 95% CI=1.6–2.0). Of eight distinct DC areas, the two with the lowest crude rates of oral cancer were areas with the highest household incomes. Survival 2 years after diagnosis, irrespective of stage of diagnosis, was poor among black males in DC, compared with black males in SEER-9 (local-stage: 33.7% versus 71.6%; regional-stage: 31.5% versus 43.3%; distant-stage: 4.9% versus 34.4%).

Conclusions: The incidence rate of oral cancer in DC was higher than any region within SEER-9. Among DC's black males, the rate was approximately double and survival was poorer than among black males in SEER-9.

Keywords: oral cancer, neoplasm staging, survival rate, District of Columbia

Rapid Assessment of Health Needs and Resettlement Plans Among Hurricane Katrina Evacuees — San Antonio, Texas, 2005
9:55 a.m.

Authors: Parmi S. Suchdev, N. Rogers, A. Chapman, R. Plotinsky, M. Jhung, E. Miller

Background: More than 10,000 evacuees fleeing Hurricane Katrina arrived in San Antonio, Texas, and several thousand evacuees remained in evacuation centers 2 weeks after the evacuation. The San Antonio Metropolitan Health District and CDC conducted a needs assessment to help city authorities prepare for evacuees' future health, housing, and social services needs.

Methods: While waiting to receive monetary aid from the American Red Cross, heads of households living in the four main San Antonio evacuation centers were asked about 1) their basic demographics, 2) chronic medical conditions, physical or mental disabilities, or counseling needs of household members, and 3) their settlement plans.

Results: Interviews with 1,360 heads of households were completed with a response rate of 95%. Respondents were 89% African American with a median age of 46 years (range, 18-49 years); 91.1% were from a New Orleans postal code. Before evacuation, 50.8% of heads of households held nonprofessional jobs, and 29.4% were unemployed, retired, or on disability assistance. Moreover, 42.2% (95% confidence interval [CI]=39.5-44.9) of households had a household member with a chronic medical condition, 27.6% (CI=25.2-30.1) had a member with a physical or mental disability, and 20.1% (CI=16.2-25.3) had a member needing counseling services. Approximately half (51.0%, CI=48.3-53.7) of evacuee households planned to settle in San Antonio; of these, 61.6% (CI=57.8-65.2) reported needing government housing assistance.

Conclusions: A large and needy population of Hurricane Katrina evacuees plans to settle in San Antonio, and their health and housing needs will be ongoing. These findings may be useful to San Antonio officials as they plan long-term resources to better assist both current and future evacuee populations.

Keywords: natural disasters, needs assessment, health services, housing, mental health

Tuesday, April 25, 2006
Concurrent Session E2: TB Or Not TB? That Is The Question: Tuberculosis
Habersham Room
8:30 a.m.–10:15 a.m.
Moderator: Kenneth G. Castro

Uninterrupted *Mycobacterium tuberculosis* Transmission in a Rural Community — Indiana, 1999–2005
8:35 a.m.

Authors: Michele C. Hlavsa, M. Haddad, P. Moonan, C. Caudill, E. Dziuban, L. Hampton, J. Hardacre, L. Robertson, W. Remington, D. Tuckey

Background: As tuberculosis (TB) incidence has decreased in the United States, the disease burden has shifted to foreign-born and non-white, U.S.-born populations. However, in October 2005, genotyping data suggested prolonged, ongoing transmission of a single strain of *M. tuberculosis* among white, U.S.-born persons in Indiana. We investigated to determine the extent of transmission and develop control strategies.

Methods: We examined the national TB genotyping database, reviewed patient medical records, re-interviewed patients, performed contact investigations, and evaluated local TB control practices.

Results: The outbreak strain represented 0.3% (42/13,219) of isolates submitted to the national genotyping program, primarily (i.e., 27 [64%] of 42) by Indiana, a state with low TB incidence (2.1/100,000 in 2004). In one rural Indiana county, 23 (92%) of 25 cases (1999–2005) were attributable to this strain. For 10 (45%) of the 22 pulmonary, outbreak-related cases, ≥60 days had elapsed from symptom onset to diagnosis. Of the 10 reported cases (13.2/100,000) in 2005, seven (70%) could have been prevented had the patient been identified during contact investigations of previously reported cases and completed therapy for latent TB infection. Four (40%) patients who began treatment in 2005 were non-adherent. The county had no dedicated staff consistently providing directly observed therapy or conducting contact investigations, mainstays of TB control.

Conclusions: This investigation demonstrated failure to interrupt transmission of a single TB strain over a 7-year period. A major challenge in the context of decreasing incidence is maintaining an infrastructure to ensure timely detection of TB cases, identification and evaluation of exposed contacts, and completion of therapy.

Keywords: tuberculosis, disease outbreaks, control and prevention, *Mycobacterium tuberculosis*

Tuberculosis Outbreak Investigation in a Crack House Reveals Limited Use of Traditional Contact Investigation Methods — Miami, 2004–2005
8:55 a.m.

Authors: Rana Jawad Asghar, D.E. Patlan, J. Abellard, N. Kapur, M. Miner, J. Spurlock, J.M. Ford, H.D. Rhodes, D. Beall, M. Fraser, S. Anthony, E.B. Simmonds, D. Katz, and J. Oeltmann

Background: Identifying persons named by the tuberculosis (TB) patient as their close contacts (i.e. named contacts), has been the mainstay of traditional TB contact investigations, and named contacts have received high priority for screening. Illicit drug users with TB are often reluctant to name close contacts. From January 1, 2004 through May 31, 2005, a cluster of 18 isoniazid-resistant TB cases with matching genotypes was identified in Miami. An investigation began in July 2005 which revealed the limits of name-based contact investigation.

Methods: We reviewed medical records and interviewed patients to find named contacts and locations. Observed contacts were those who were not named but were encountered at the same crack house frequented by patients. Contacts were evaluated for latent TB infection (LTBI) with a tuberculosis skin test (TST).

Results: All 18 case-patients had culture-confirmed pulmonary TB; 15 (83%) had positive sputum smear results for acid-fast bacilli. Twelve (67%) reported crack use and 14 (77%) illicit drug use. We evaluated 187 contacts. Of these, 91 (49%) were named, 77 (41%) were screened at two locations identified by patients (i.e, a dialysis center and a church), and 19 (10%) were observed contacts. Compared to named contacts, individuals at two identified locations had no elevated risk of a positive TST result (RR 1.1 CI 0.4–3.0 and RR: 1.4 CI 0.3–6.1 respectively). Compared to named contacts, observed contacts were 8 times as likely to have positive TST results (RR 7.8 CI 3.8–16.1).

Conclusions: Among illicit drug users, traditional name-based contact investigations may yield low-priority contacts and miss high-priority observed contacts for screening, evaluation, and treatment of LTBI for prevention of future TB cases and transmission.

Keywords: genotyping, tuberculosis, tuberculosis outbreak, diagnosis, Miami, prevention and control, drug users

Retrospective Cohort Study of the Impact of Surgery on Treatment Outcomes Among Multidrug-Resistant Tuberculosis Patients — Latvia, 1997–2002
9:15 a.m.

Authors: Kevin P. Cain, G. Dravniece, T. Holtz, I. Silins, V. Riekstina, K. Laserson, C. Wells, V. Leimane

Background: Latvia has one of the world's highest rates of multidrug-resistant tuberculosis (MDR-TB), TB resistant to at least isoniazid and rifampin. MDR-TB is associated with poor treatment outcomes, especially among those previously treated. In Latvia, adjunctive lung surgery is used for MDR-TB. We sought to determine whether surgery improved MDR-TB treatment outcomes in Latvia.

Methods: We conducted a retrospective cohort study of patients initiating treatment for MDR-TB in Latvia 1997–2002. We included all patients treated with surgery and a random sample of patients not treated with surgery. We defined good outcomes as patients cured or completing treatment. MDR-TB treatment categories were defined as follows: Category 1 – no previous TB treatment; Category 2 – previous treatment for drug-susceptible TB; and Category 3 – previous treatment for MDR-TB. We did multivariate analysis, controlling for potential confounding variables including socio-demographic factors, medical conditions, drug-resistance, and chest radiograph result.

Results: Treatment outcomes were good in 66/77 (86%) patients treated surgically for MDR-TB vs. 111/176 (63%) of those not surgically treated ($p<0.05$). MDR-TB treatment category modified the relationship between surgery and treatment outcome. In a multivariate model including only Category 2 patients, 42/44 (95%) patients treated with surgery had good outcomes, vs. 52/97 (53%) patients not treated with surgery (odds ratio [OR] 21.1, 95% confidence interval [CI] 3.7–120). In a model including only category one or three, surgery was not associated with treatment outcome (OR 1.0, 95% CI 0.3–3.1).

Conclusions: Surgical treatment for MDR-TB patients in Latvia was associated with improved outcomes among patients previously treated with first-line drugs. Although we could not control for all medical comorbidities, it appears that adjunctive surgery in this group may improve survival.

Keywords: tuberculosis, multidrug-resistant, mortality, Latvia, surgery

Extensive Drug-Resistant Tuberculosis: Global Survey of Supranational Reference Laboratories for *Mycobacterium tuberculosis* with Extensive Resistance to Second-Line Drugs
9:35 a.m.

Authors: N. Sarita Shah, A. Wright, F. Boulahbal, C. Gilpin, F. Drobniewski, G. Bai, M. Havelková, R. Lepe, B. Metchock, M. Rodrigues, F. Portaels, A. Van Deun, S. Rüsch-Gerdes, V. Vincent, L. Barrera, K. Laserson, C. Wells, P. Cegielski

Background: In the 1990s, multidrug-resistant (MDR) tuberculosis (TB) (TB resistant to at least isoniazid and rifampin) emerged as a threat to global TB control. In 1994, well-performing mycobacteriology laboratories formed a network of Supranational Reference Laboratories (SRLs) to lead MDR-TB surveillance. SRLs receive varying proportions of isolates from each country for surveillance, diagnosis, and quality assurance. Since 1994, many countries have noted resistance to an increasing number of drugs. We sought to determine the extent to which highly-resistant and potentially untreatable *Mycobacterium tuberculosis* strains have been identified by SRLs.

Methods: We requested data from all 23 SRLs on isolates tested from 2000–2004 for resistance to >3 of the 6 classes of second-line drugs (SLDs) used to treat MDR-TB (e.g., aminoglycosides, polypeptides, fluoroquinolones, thioamides, cycloserine, and para-aminosalicyclic acid). Extensive drug-resistant (XDR) was defined as MDR plus resistance to >3 SLD classes.

Results: Of 17,459 strains collected by 12 of 23 SRLs, 3461 (20%) were MDR and 344 (10%) MDR isolates were also XDR. XDR-TB was detected in 14% (55/406) of MDR isolates from Eastern Europe/Russia, 13% (204/1563) from Asia, 8% (35/451) from Western Europe, 6% (32/543) from Latin America, and 2% (1/61) from sub-Saharan Africa. From 2000–2004, the proportion of XDR-TB, as detected by the SRL network, nearly tripled from 4.4% (13/294) to 13% (233/1816) of MDR-TB isolates tested.

Conclusions: XDR-TB has emerged as a new threat to public health and TB control on every inhabited continent. Further emergence of XDR-TB threatens TB control gains and potentially could lead to conditions seen in the pre-antibiotic era. Further investigation of trends and expanded efforts to prevent and treat drug resistant TB effectively are urgently needed.

Keywords: tuberculosis, multidrug-resistant, *Mycobacterium tuberculosis*, drug resistance

Evaluation of Access to and Acceptance of HIV Testing Among Patients with Tuberculosis — Rwanda, 2005
9:55 a.m.

Authors: Eric S. Pevzner, G. Kabanda, A. Finlay, G. Vandebriel, D. Kamugundu, K. Laserson, L. Nelson, A. Ayaba, C. Wells, V. Koscelnik, M Gasana

Background: Tuberculosis (TB) is a leading cause of morbidity and mortality for people living with HIV/AIDS. In October of 2005, the Rwandan Ministry of Health adopted a new policy that included routinely providing HIV counseling and testing for all patients with TB, and HIV care for co-infected patients. Prior to implementation of the policy, we conducted an evaluation of access to and acceptance of HIV testing among patients with TB.

Methods: We included a non-probability sample of 22 geographically representative health facilities. The evaluation consisted of 1) interviewing patients to examine their access to and acceptance of HIV testing, 2) reviewing TB registries and treatment cards to determine the number of patients with documented HIV test results, and 3) interviewing staff to evaluate the availability of HIV counseling and testing and other TB/HIV services.

Results: Of the 207 patients interviewed, 158 (76%) reported being offered an HIV test and 157 (99%) of these patients reported getting tested. Among 134 patients that disclosed their status, 66 (49%) reported being HIV-infected. Our review of the TB registries and treatment cards identified 490 patients registered between 10/1/04–12/31/04, 258 (53%) had a documented HIV test result; of these, 113 (44%) had a positive test result. Of the 40 TB clinic staff interviewed, 11 (28%) reported offering testing to 100% of patients with TB and six reported offering testing to less than 50% of patients.

Conclusions: Patients' self-reported acceptance of HIV testing suggests that the national policy of routine testing may be widely accepted by patients with TB. However, interventions are needed to address barriers to health care workers routinely offering HIV testing to all patients with TB.

Keywords: tuberculosis, TB, HIV, AIDS, TB/HIV co-infection, HIV counseling and testing, Rwanda

Tuesday, April 25, 2006
Concurrent Session F1: Sharing the Love: Sexually Transmitted Disease
Grand Ballroom
10:45 a.m.–12:15 p.m.
Moderator: Stuart Berman

Primary and Secondary Syphilis Incidence Trends Among a Cohort of Patients Infected with Human Immunodeficiency Virus — United States, 1998–2003
10:50 a.m.

Authors: Dina Hooshyar, M. Juhasz, A.D. McNaghten, H. Weinstock, J. Beltrami, J. Heffelfinger

Background: The Centers for Disease Control and Prevention's (CDC) Advancing HIV Prevention initiative supports focusing prevention services on HIV-infected persons. The acquisition of syphilis among HIV-infected persons suggests ongoing high-risk sexual behaviors that may enhance HIV and syphilis transmission. More information about syphilis in HIV-infected persons would help direct prevention efforts.

Methods: To determine primary and secondary (P&S) syphilis incidence among HIV-infected persons, we examined data from CDC's Adult/Adolescent Spectrum of HIV Disease Project, a longitudinal medical chart abstraction project conducted in 10 U.S. cities. We assessed annual P&S syphilis incidence rates per 100,000 person-years (PY) during 1998–2003. We used multivariable Poisson regression modeling to determine risk ratios (RR) adjusted for age, HIV exposure category, and nadir CD4.

Results: Of 28,961 patients, 72% were male; 44%, African American; 26%, white; 18%, Hispanic; and 41%, aged 30–39 years. Documented HIV exposure category was male-male sex for 46% and injection drug use (IDU) for 18%. Number of incident P&S syphilis cases was 146. Overall P&S syphilis incidence rate was 227 cases/100,000 PY (95% confidence interval [CI]=192-267); incidence rate increased from 110 cases/100,000 PY in 1998 to 396 cases/100,000 PY in 2003. Risk for incident P&S syphilis was more than 4 times higher in 2003 than in 1998 (adjusted RR= 4.3 [95% CI=2.3-8.2; p< 0.0001]) and 2 times higher for male-male sex HIV exposure category than for IDU (adjusted RR= 2.0 [95% CI=1.2-3.4; p=0.01]).

Conclusions: These results underscore the importance of routinely screening HIV-infected persons for syphilis and other sexually transmitted infections, assessing their risk behaviors regularly, offering prompt treatment, and providing prevention counseling. Particular attention should be directed toward men who have sex with men.

Keywords: HIV, syphilis, incidence, trends

"Safe Sex" or No Sex: What U.S. Clinicians Are Saying to Adolescents About How To Prevent Sexually Transmitted Diseases — Results from a National Survey, 2004
11:10 a.m.

Authors: Zsakeba T. Henderson, K. Irwin, D. Montaño, D. Kasprzyk, L. Carlin, C. Freeman, N. Jain, R. Barnes

Background: Over 15 million new cases of sexually transmitted diseases (STDs) occur annually in the United States, with over two-thirds in people aged 15-24 years. Various methods prevent STDs and the serious and costly complications of undetected, untreated infections. Current recommendations encourage clinicians to assess STD risk periodically and provide prevention counseling to adolescents. We conducted a national survey to examine these practices among U.S. adolescent care providers.

Methods: In 2004, we surveyed nationally representative samples of physicians in internal and adolescent medicine, family/general practice, and obstetrics/gynecology; and mid-level providers (nurse-midwives, physician-assistants, nurse-practitioners) who care for adolescents. The mail survey assessed STD risk assessment, counseling, and education practices during routine adolescent check-ups. We weighted categorical analyses for differences in sampling fraction and non-response by specialty.

Results: The overall adjusted response rate was 82% (n=3339); 87% of respondents (n=2958) provided routine adolescent check-ups. Over 80% reported usually/always asking about adolescents' sexual behavior to assess STD risk. More reported usually/always recommending condoms (90%) and monogamy/limiting sex partner number (76%) than abstinence (54%) to prevent STDs. Of respondents who reported that ≥75% of their patients were <18 years-old (n=361), 93% reported routinely providing STD prevention education to patients who they believed were sexually active. Providing in-person education (73%) was far more common than delegating to staff (15%) or providing written materials (5%).

Conclusions: Most clinicians in our survey reported assessing STD risk, recommending various STD prevention methods, and providing STD education for adolescents during routine check-ups. Further research is needed to determine how reports compare to actual practice, why only half recommended abstinence, and whether clinicians find written prevention materials effective or not.

Keywords: sexually transmitted diseases, adolescents, prevention, sexual abstinence, condoms

Rising Rate of Gonorrhea Among Heterosexuals — San Francisco, 2005
11:30 a.m.

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

Background: Although CDC reported record low rates of gonorrhea in the United States in 2004, gonorrhea remains the second most common reportable disease nationwide, has substantial health sequelae among women (e.g., infertility, pelvic inflammatory disease, or ectopic pregnancy), and increases the risk of transmitting and acquiring human immunodeficiency virus infection. In San Francisco, during 2000–2004, gonorrhea had two distinct epidemiologic patterns: slowly increasing among men who have sex with men (MSM) and slowly decreasing among heterosexuals.

Methods: To identify unmet disease prevention and care needs among groups with increased rates of gonorrhea, we compared age, sex, race/ethnicity, and gender of sex partners in gonorrhea case reports for the first 9 months of both 2004 and 2005.

Results: In 2005, gonorrhea in San Francisco increased by 14% compared with 2004. Overall, a 61% increase occurred in gonorrhea among women (from 160 to 257 cases). Among women aged 15–19 years, gonorrhea increased 73% (from 49 to 85 cases). Among heterosexual men, gonorrhea cases increased 34% (from 115 to 154 cases), compared with a 9% increase (from 861 to 940 cases) among MSM. In 2005, a total of 411 (23%) of 1,786 gonorrhea cases occurred among heterosexuals, compared with 276 (18%) of 1,573 cases in 2004 ($\chi 2=15.4$; $p<0.001$). In 2005, a total of 205 (50%) of 411 cases among heterosexuals occurred among blacks, compared with 138 (50%) of 276 in 2004.

Conclusions: Gonorrhea in San Francisco increased among heterosexuals, particularly among adolescents and young adults. A high proportion of cases were among blacks. In response to this increase, additional intervention efforts to control gonorrhea in San Francisco are focusing on young heterosexuals, particularly blacks.

Keywords: gonorrhea; sexually transmitted diseases, bacterial

Increasing Incidence of Gonorrhea — Utah, 1999–2004
11:50 a.m.

Authors: Juliana S. Grant, T. Lane, R. Rolfs

Background: Rates of gonorrhea, the second most commonly reported sexually transmitted disease in the United States, have declined nationwide since 1975. In Utah, however, rates increased from a low of 9.6/100,000 in 2001 to 25.6/100,000 in 2004. We analyzed data for 1999–2004 to evaluate possible causes for the increase.

Methods: The Utah Department of Health (UDOH) collects demographic, laboratory, and interview data on gonorrhea cases. Data for 1999–2000 were combined and compared with 2003–2004. Rate ratios (RR) and 95% confidence intervals (CI) were calculated by sex, age, race/ethnicity, and health district. Number of investigative interviews performed and provider type were also evaluated. Chi-square tests for significance were calculated.

Results: Rates increased similarly for males (from 11.6/100,000 to 24.3/100,000 [RR:2.08; 95% CI=1.80–2.42]) and females (from 8.7/100,000 to17.3/100,000 [RR:1.97; CI=1.67–2.35]). Non-Hispanic whites had the largest proportionate increase (from 6.2/100,000 to 16.4/100,000 [RR:2.65; CI=2.29–3.07]). Blacks and Hispanic whites also had significant increases. Persons aged 20–24 years had the largest increase (from 29.9/100,000 to 69.4/100,000); however, all age-specific rates increased substantially. Two-to-fourfold increases were observed in half of local health districts, representing urban, rural, and mixed populations. Similar proportions of patients were interviewed during the two periods (86.3% versus 84.7%; $p=0.45$). Proportionately, fewer cases were reported by public health clinics in 2003–2004 versus 1999–2000 ($p=0.001$); more cases were reported by private providers.

Conclusions: Gonorrhea rates increased for men and women, all racial/ethnic groups, and all age groups. No single demographic group accounts for the increased rates. Similar proportions of intervention interviews were performed. UDOH is conducting additional studies of risk behaviors, laboratory-testing practices, and disease investigation activities, to further evaluate this public health problem.

Keywords: gonorrhea, Utah, sexually transmitted diseases–bacterial

Tuesday, April 25, 2006
Concurrent Session F2: No Warrant Needed: Surveillance
Habersham Room
10:45 a.m.–12:15 p.m.
Moderator: Adolfo Correa

Sporadic *Mycobacteria* Infections Associated with Nail Salons — California, 2003–2005
10:50 a.m.

Authors: Jean Yuan, K. Facciolo, D. Vugia

Background: Rapidly growing *Mycobacteria* (RGM) cause rare nosocomial cutaneous infections. In 2000, the California Department of Health Services (CaDHS) investigated a community outbreak of *M. fortuitum* furunculosis associated with nail salon whirlpool footbaths and identified leg-shaving as a risk for infection. To determine whether sporadic cases of nail salon-associated RGM also occur, CaDHS implemented a pilot surveillance system.

Methods: We defined a case as laboratory-confirmed RGM cutaneous infection in a California resident's leg, identified since January 2003. Local health departments completed a standardized case report. All data were entered into Microsoft® Excel® and analyzed by using SAS® 9.1.

Results: By November 2005, a total of 19 cases were reported. All patients were female; the median age was 32 years (range: 16–47 years); and 94% were white. None had a chronic medical condition. All patients had a pedicure with a whirlpool footbath at a nail salon before developing the skin infection. Eighty-three percent had shaved their legs within 24 hours of getting a pedicure. Patients had an average of six skin lesions each (range: 1–19). The diameter of a patient's largest lesion ranged from 4.8 mm to 30 mm (median: 18 mm). Isolated species included *M. fortuitum* (47%), *M. chelonae* (21%), and *M. abscessus* (16%). Ninety-five percent of patients were treated with antibiotics.

Conclusions: We documented sporadic cases of RGM lower-extremity infections associated with nail salon whirlpool footbaths. Patients were healthy, white women who had shaved before a pedicure involving a whirlpool footbath. Although additional studies are needed to determine the risk for such sporadic infections, we recommend that women contemplating a pedicure involving a whirlpool footbath not shave their legs before their visit.

Keywords: atypical *mycobacterium* infections, surveillance, mycobacteriaceae, infectious skin diseases, leg dermatoses

Completeness and Timeliness of Laboratory Reporting for Notifiable Diseases: A Comparison of Paper and Electronic Reporting — New York City, 2005
11:10 a.m.

Authors: Trang Q. Nguyen, L. Thorpe, H. Makki, M. Saynisch, D. Kapell, J. Baumgartner, F. Mostashari

Background: To identify outbreaks and prevent transmission of communicable diseases (CD) and sexually transmitted diseases (STD), complete and timely notifiable disease reporting to the New York City (NYC) Department of Health and Mental Hygiene (DOHMH) is critical. As mandated by NYC, laboratories must discontinue paper reporting and transmit reports through the Electronic Clinical Laboratory Reporting System (ECLRS) by July 2006. In preparation for ECLRS certification by DOHMH, laboratories send duplicate electronic and paper reports that DOHMH assesses for equivalency of information. We evaluated whether electronic reporting improved the quality of surveillance.

Methods: We assessed duplicate electronic and paper reports from laboratories preparing for ECLRS certification. Timeliness was measured by calculating the median number of days from laboratory diagnosis to receipt of paper or electronic report by DOHMH. Completeness of ECLRS was assessed by measuring the proportion of all CD and STD case reports submitted electronically.

Results: As of August 2005, 30 (28%) of the 106 laboratories performing CD and STD tests were ECLRS-certified; 34 (32%) were preparing for certification; and 42 (40%) had not begun using ECLRS. The proportion of paper reports also reported in ECLRS was ~100% among certified laboratories and 82% for uncertified laboratories. ECLRS reports reached DOHMH faster than paper reports (median: 11 days faster; range: 3–42 days). Approximately 39% of 25,726 CD reports and 34% of 12,174 STD reports entered into DOHMH surveillance systems were sent through ECLRS.

Conclusions: ECLRS improved timeliness of reporting. The certification process minimized loss of completeness when transitioning from paper to electronic reporting. Certification should be supported, and the quality of data from certified laboratories must be ensured to maintain a useful surveillance system.

Keywords: disease notification, public health informatics, population surveillance, quality control, New York City

Allograft-Associated Infections: Reports to the Food and Drug Administration's MedWatch Program — United States, 2001–2004
11:30 a.m.

Authors: Su H. Wang, C. Zinderman, R. Wise, M.M. Braun

Background: More than 1 million allograft tissues are transplanted annually in the U.S. As part of the federal effort to improve tissue safety, FDA's Current Good Tissue Practices (CGTP) Rule went into effect May 2005, requiring tissue establishments to report certain allograft-associated infections (AAIs). As a baseline, we reviewed AAI reports received by FDA prior to the CGTP.

Methods: We reviewed AAI reports received by FDA's MedWatch adverse event reporting system during 2001-2004. An AAI was defined as a reported infection involving a human tissue within 1 year of transplant. We examined case demographics, tissue type, infection, clinical outcome, and reporter type.

Results: We identified 83 cases of AAIs. Median patient age was 40 years (range: one month-87 years). The allografts involved included heart valves (42%), tendons (33%), bones (8%), blood vessels (6%), ocular tissues (5%), and skin (4%). Commonly reported clinical outcomes were hospitalization (72%), antibiotic therapy (46%) and graft removal (42%). Patients expired in 11 reports, nine involving heart valves. In the 64 reports with identification of suspected organism(s), bacteria were most common (64%), followed by fungi (39%) mixed infections (12%), and CJD (2%). The median time from transplant to infection was 5.5 weeks (range: 3 days-52 weeks). Voluntary reporters of AAIs were quality, infection control or risk management personnel (45%), physicians (15%), lay persons (15%), nurses (13%), and surgical staff (12%).

Conclusions: Our AAI review is the first utilizing MedWatch reports. AAIs led to serious outcomes and involved many tissue types, though we were limited by information for determining causality. In addition to required reporting by tissue establishments, increased reporting by health care professionals will improve tissue surveillance.

Keywords: tissue transplants, adverse events, surveillance, disease transmission

Some Like it "Hot": Rapid Identification of Wild Poliovirus Transmission by Acute Flaccid Paralysis Surveillance — India, 2004
11:50 a.m.

Authors: Sucheta J. Doshi, H. Sandhu, M. Watkins, J. Smith, S. Durrani, S. Bahl, J. Wenger.

Background: In the final stages of polio eradication, highly sensitive AFP surveillance is required for rapid detection of wild poliovirus (WPV) so that a mass immunization response can be initiated promptly. AFP cases include children aged <15 years with sudden onset of weakness or paralysis. To facilitate rapid WPV detection in India, some AFP cases are classified as "hot" to be prioritized for WPV isolation. The "hot" case definition depends on clinical judgment but generally includes fever and asymmetric paralysis in children aged <5 years. This study was conducted to determine if a refined "hot" case definition could increase sensitivity and timeliness of WPV detection.

Methods: We analyzed 2004 AFP surveillance data on 1,036 children aged <5 years from districts with WPV transmission in Uttar Pradesh state. WPV cases were compared to non-polio AFP controls to identify risk factors for WPV disease. Multivariate regression analysis was performed to identify variables predictive of WPV cases; these were grouped to create a new "hot" case definition.

Results: Of 81 WPV cases, the original "hot" variable identified 48 (59%); positive predictive value (PPV) was 24%. Asymmetric paralysis, fever at paralysis onset, age <2 years, and marginalized status (MS) were significant predictors ($p<0.05$) of WPV cases and were grouped into a new variable that identified 33(41%) cases with a PPV of 32%. When this new variable was combined with the original "hot" case variable, eight additional WPV cases were identified, increasing sensitivity from 59% to 69%.

Conclusions: Sensitivity and timeliness of WPV detection in India can be improved by rapidly investigating cases with age <2 years, MS, fever and asymmetric paralysis along with cases already clinically classified as "hot."

Keywords: poliovirus, paralysis, surveillance, fever, India

Tuesday, April 25, 2006
Session G: Cat5 Is Not a Zoonosis: Hurricane - Associated Disease and Injury
Grand Ballroom
1:45 p.m.–4:00 p.m.
Moderator: Raoult Ratard and Thomas Sinks

Carbon Monoxide Poisoning from Hurricane-Associated Use of Portable Gasoline-Powered Generators— Florida, 2004
1:50 p.m.

Authors: David Van Sickle, D. Chertow, J. Schulte, L. Harduar-Morano, C. Blackmore, P. Patel, D. Johnson, J. Ferdinands, R. Moolenaar

Background: During August–September 2004, four major hurricanes hit Florida, resulting in power outages that affected several million households, approximately 17% of which used a generator for power. At least 167 persons were poisoned by carbon monoxide (CO) produced by these devices; seven persons died. We investigated these incidents to identify opportunities for future poisoning prevention efforts.

Methods: We reviewed medical records from 10 health-care facilities in Florida to identify households with persons diagnosed with unintentional CO poisoning (ICD-9 code 986) during August 13–October 15, 2004. We contacted one adult member of each household by telephone to administer a survey addressing generator use.

Results: We identified 51 households in which CO poisoning occurred, and we interviewed a respondent in 35 (69%). Of 149 affected persons, 91% sought care and 34% required hyperbaric oxygen treatment. All reported use of portable, gasoline-powered generators. In 18 (51%) incidents, generators were located outside; in 11 (31%), in the garage; and in 5 (14%), inside the home. Concerns about theft (43%) and exhaust (31%) most often influenced generator placement. Twenty-six (74%) respondents had not previously owned a generator. Twenty-three (66%) purchased their generators, usually from home improvement or discount retailers. No respondents purchased CO alarms while buying generators, and only 14% had an alarm at the time of the poisoning. Twenty-one (67%) respondents had read or heard prevention messages before the incident.

Conclusions: After hurricanes, a substantial number of persons could be poisoned by CO from portable, gasoline-powered generators, even when operated outside. Current public health guidance is inadequate and should be revised to encourage locating generators farther away from occupied buildings.

Keywords: carbon monoxide poisoning, power sources, indoor air pollution, natural disasters, Florida

Disasters, Drugs, and Disease: Health-Care Encounters and Medication Use Among Evacuees of Hurricane Katrina — San Antonio, Texas, 2005
2:10 p.m.

Authors: Michael A. Jhung, C. Rohr-Allegrini, R. Sanchez, M. Marx, D. Thoroughman, L. Nelson, N. Rogers, P. Suchdev, A. Chapman, R. Plotinsky, E. Miller, J. Hageman, K. Puchosic, R. Arthur, F. Guerra, D. Jernigan

Background: Hurricane Katrina forced the relocation of thousands of people into mass evacuee facilities. Medical relief efforts focused on anticipated morbidity from injury and infectious diseases. Chronic diseases can also be aggravated by disaster conditions and may contribute substantially to the healthcare burden generated by evacuees. We investigated whether standard disaster medical assistance team (DMAT) pharmacies, as deployed in San Antonio, TX, were appropriately designed to address the medication needs of Hurricane Katrina survivors with chronic diseases.

Methods: We implemented a syndromic surveillance system to monitor disease in ten evacuee facilities in San Antonio, TX from September 6th-22nd. We collected data on medications dispensed by a DMAT pharmacy and two onsite retail pharmacies.

Results: Daily evacuee census ranged from 3,169 to 13,975 (median = 4, 398). Multiple evacuees required special medical management due to pre-existing conditions (median = 7% of daily census, range 6%-10%). Patient encounters (n = 4,679) generated 5,034 healthcare complaints: 51% were judged to be for acute-care; 22% were considered non-acute (10% for management of chronic disease, 12% for non-acute routine care); the remaining 27% were indeterminate. The DMAT pharmacy filled 2,705 medication requests; 26% were for chronic disease conditions. Onsite retail pharmacies filled prescriptions for medications the DMAT pharmacy was unable to supply. Two of these pharmacies filled 1,993 prescriptions, 56% of which were for chronic disease conditions.

Conclusions: Current DMAT pharmacy caches may not meet medication requirements of survivors with chronic diseases. While chronic disease complaints account for a small number of medical care visits, they represent a considerable portion of pharmaceutical demands. Disaster preparedness efforts should incorporate medications consistent with the anticipated burden of chronic disease among survivors.

Keywords: disasters, drug therapy, chronic disease, relief work

Rapid Assessment of Newborn Screening in Louisiana After Hurricane Katrina, 2005
2:30 p.m.

Authors: Emad A.Yanni, M. Lobato, A. Hagar, C. Myers, A. Rue, C. Evans, R. Wang, R. Olney, L. Lambert

Background: Hospital-based newborn screening (NBS) is essential for identifying newborns with several harmful or potentially fatal diseases. Hurricane Katrina disrupted the Louisiana state-mandated NBS program. Specimens might have been lost, damaged, or delayed in processing. The Louisiana Office of Public Health (LAOPH) and CDC conducted a rapid assessment to determine the extent of newborn screening disruption between August 15 and September 21, 2005.

Methods: A list of hospitals was obtained from the LA Hospital Association. A telephone-based questionnaire was developed to compile the number of live births during the assessment period, the number of NBS specimens collected for testing, and the number of missing results. Hospitals also received a memo instructing them to redirect NBS specimens to the state lab in Shreveport and instructions to follow-up newborns that required retesting.

Results: Of 67 hospitals with labor and delivery services, 8 were still closed, 5 partially completed the questionnaire, and 54 hospitals with 5,962 live births completed it (80.5%). During the study period, 46 hospitals sent 4,884 NBS tests, received 3,681 NBS results (75.3%), and reported that results were not available for 1,203 (24.6%) tests. Eight additional hospitals had no access to information because 1,074 test results (18% of live births) were sent directly to pediatricians. Hospitals sent lists of newborns without test results to LAOPH to contact their parents for retesting. Two newborns with metabolic disorders were identified during the study period.

Conclusions: Hurricane Katrina severely disrupted NBS services. Collaboration between the LAOPH and CDC allowed for rapid identification and retesting of many infants with missed NBS results. This assessment underscores the importance of having an alternate public health plan for activation during disasters.

Keywords: Hurricane Katrina, newborn screening, Louisiana Office of Public Health

Mental Health Outcomes in the New Orleans Police Force After Hurricane Katrina — New Orleans, Louisiana, 2005
2:50 p.m.

Authors: Christine A. West, B. Bernard, C. Mueller, R. Driscoll, M. Kitt, J. Hurrell, S. Tak

Background: Research is limited on the risk for developing psychological distress in police officers involved in disaster response. We identified risk factors for depression and Posttraumatic Stress Disorder (PTSD) symptoms reported among approximately 1200 New Orleans Police Department (NOPD) officers who provided relief and public safety services to affected communities following Hurricane Katrina.

Methods: We conducted a cross-sectional survey of mental health outcomes related to personal and work-related exposures among NOPD officers. Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale and post-traumatic stress was assessed using the Posttraumatic Stress Disorder Checklist.

Results: Of the 912 (76% participation) NOPD officers who completed the questionnaire, 227 (26%) reported symptoms consistent with depression and 170 (19%) reported symptoms consistent with PTSD. Using multivariate analysis controlling for age and gender, officers involved in any of the following post-hurricane activities were more likely to report symptoms consistent with PTSD (prevalence ratio [PR]=1.7, confidence interval [CI]=1.2,2.2): recovery of bodies, involvement in gunfire incidents, or Special Weapons and Tactics (SWAT) activities. Increased prevalence of depressive symptoms was associated with reports of isolation (PR=1.6, CI=1.2,2.2), a family member injured (PR=1.7, CI=1.2,2.4), and extensive hurricane damage to their home (PR=1.4, CI=1.1,1.9). Injury due to an assault was a factor associated with symptoms of PTSD (PR=2.7, CI=1.7,4.2) and depression (PR=2.0, CI=1.2,3.3).

Conclusions: NOPD officers reported symptoms of PTSD and depression associated with work-related and personal factors in the aftermath of Hurricane Katrina. These results underscore the need for clinical follow-up and targeted interventions of individuals at risk of developing trauma-related disorders. Long-term surveillance is needed to determine the course and impact of mental health symptoms in these workers.

Keywords: police, mental health, Hurricane Katrina, Occupational health, disaster response

This Mold House: Exposure Assessment of Flood-Damaged Homes — New Orleans, Louisiana, October 2005
3:10 p.m.

Authors: Margaret A. Riggs, C. Rao, D. Van Sickle, K. Cummings, C. Brown, K. Dunn, J. Ferdinands, D. Callahan, L. Pinkerton, R. Moolenaar, P. Thorne, G. Chew

Background: Mold exposure is associated with respiratory health effects. The unprecedented disaster of Hurricanes Katrina and Rita caused extensive mold growth in homes resulting in tremendous public health concerns and uncertainty exacerbated by inconsistent messages. We conducted an environmental assessment of homes in the New Orleans (NO) area to determine the type and extent of mold exposure.

Methods: We used a geographic information system to randomly select 112 homes, stratified by water damage and then visually assessed mold growth. Homes were classified with heavy mold coverage if mold covered >50% of the walls in the most mold-damaged room and by flood level as high (>6ft), medium (3-6ft), or low (<3ft). Air samples from a subset of 20 homes were analyzed for culturable fungi and markers of mold (β(1,3-1,6)-glucans) and bacteria (endotoxin); geometric means and standard deviations (GSD) were calculated.

Results: Mold growth occurred in 51(45.5%) homes; 19(16.9%) had heavy coverage. Flood levels were high at 21(18.8%), medium at 19(17.0%), and low at 72(64.3%) homes. Seventy-six (67.9%) had roof damage with water leakage. Predominant fungi indoors were *Aspergillus*, Penicillium, and Trichoderma. Geometric mean air levels for β(1,3-1,6)-glucans were 1.6 ug/m3 (GSD 4.4) indoors and 0.9 ug/m3 (GSD 2.0) outdoors; endotoxin levels were 23.3 EU/m3 (GSD 5.6) indoors and 10.5 EU/m3 (GSD 2.5) outdoors.

Conclusions: We estimate that over 110,000 residences have elevated mold and bacteria levels and over 40,000 have heavy mold growth in the NO area. Levels of microbial exposure markers exceeded those previously associated with health effects. Residents should follow CDC recommendations developed following the 2005 hurricanes, including use of appropriate precautions and personal protective equipment when entering or cleaning affected homes.

Keywords: hurricane, flood, mold, Katrina, New Orleans, indoor air quality

Rapid Health Needs Assessment Among Hurricane Katrina Evacuees — Arkansas, 2005
3:30 p.m.

Authors: Fuyuen Y. Yip, L. Zapata, M. Phillips, G. Chavez, K. Robinson, A. Pelletier, J. Barson, L. Lewis, L. Backer, C. Rubin

Background: As part of the Hurricane Katrina evacuation, approximately 15,000 Gulf Coast residents were relocated to Arkansas and dispersed among 150 shelters. To ensure that evacuees received appropriate health care, we collaborated with the Arkansas Department of Health and Human Services (ADHHS) to identify shelter residents' immediate health needs.

Methods: Over four days, we surveyed a convenience sample of evacuees in shelters containing ≥100 people. Data concerning medical history, current symptoms, and unmet health needs were obtained. Descriptive analyses were conducted. All urgent health care needs were reported to ADHHS for immediate follow-up.

Results: We surveyed 1174 evacuees in 32 shelters. The majority of respondents were black (81%) and male (55%). Almost 20% of respondents had acute health needs requiring urgent care (e.g., wound infection, suicidal ideation, and HIV-related illness); these needs were reported to ADHHS for immediate follow-up. Eighty-five percent (993) of respondents had one or more active health problem; of these, 59% were described as unmet and needing treatment. The most frequently reported problems were related to mental health (e.g., insomnia, anxiety, and depression) (37%) and oral health (e.g., loss of dentures and oral pain) (38%).

Conclusions: This assessment identified evacuees requiring urgent health care and facilitated treatment within 24 hours after interview. These findings also suggest that mental and oral health are primary concerns and should be considered when planning for, and responding to, evacuee needs during a natural disaster. This survey led directly to the immediate provision of mental and oral health services to all shelter residents upon survey completion. Rapid needs assessment surveys are useful for rapidly identifying and fulfilling the health care needs of displaced persons in disaster response.

Keywords: needs assessment, health status, natural disasters, mental health, oral health, Hurricane Katrina, evacuees

Wednesday, April 26, 2006
Concurrent Session H1:
The Abacus Is So Passé: Peavy Finalists
Grand Ballroom
8:30 a.m.–10:15 a.m.
Moderator: David Sencer

Excess Heat-Related Mortality — Phoenix Area (Maricopa County), Arizona, 2000–2005
8:35 a.m.

Authors: Fuyuen Y. Yip, A. Wolkin, A. Neri, D. Engelthaler, W. Humble, L. Lewis, L. Backer, D. Flanders, C. Rubin

Background: Heat-related deaths are preventable. During June−August 2005, temperatures reached 46.7 C (116 F) in Maricopa County, Arizona. Despite excessive heat warnings, an unprecedented 40 heat-related deaths occurred. Fatal heat waves have occurred in northern cities (e.g., Chicago) where the elderly and homebound without air-conditioning are most vulnerable. These populations differ from Maricopa County residents who commonly experience high temperatures, are heat-acclimated, and often have air-conditioning. The Arizona Department of Health Services asked CDC to help characterize populations at risk and evaluate associations between meteorologic data and total and cause-specific mortality.

Methods: We reviewed Maricopa County vital statistics data for daily heat-related, cardiovascular, and total mortality (June–August 2000–2005). We obtained meteorologic data from the National Weather Service. We used Poisson regression with regression splines to evaluate the relationship between number of deaths and maximum temperature and to control for nonlinear confounders.

Results: For June−August 2005, 40 heat-related deaths occurred (excess mortality of 153% compared with June−August 2000–2004). Thirty-one (78%) deaths were men (mean age 58, range: 31–92]); 22 (71%) men died outdoors. The average age of the 9 women who died was 75 (range: 35–90); 6 (63%) died indoors. Decedents, on average, resided in Arizona for 37 years (range: 1–86). Regression analysis revealed increased mortality risk with increased daily maximum temperatures: 1.1 deaths for each degree centigrade increase in maximum temperature ($p<0.0001$).

Conclusions: Consecutive days of high temperatures contributed to increased heat-related deaths over historical averages among this heat-acclimated population. Most excess mortality occurred outdoors among men (e.g., those who were working or homeless). Heat plans should be revised to target this at-risk population and those historically at risk.

Keywords: hyperthermia, heat, occupational exposure, environmental exposure, climate

Depressive Symptoms Among Firefighters in New Orleans After Response to Hurricane Katrina — Louisiana, 2005
8:55 a.m.

Authors: SangWoo Tak, R. Driscoll, B. Bernard, C. West, J. Hurrell

Background: Firefighters provide first response and emergency life saving services during and following disasters, thus this working population should remain healthy. While depressive symptoms among firefighters post-disaster are not uncommon, depression with associated concurrent co-morbidity has not been assessed. We evaluated depressive symptoms among firefighters who participated in the response to Hurricane Katrina and assessed associations with physical symptoms and social support.

Methods: A survey assessing health symptoms possibly related to Hurricane Katrina was administered to New Orleans firefighters November 29 to December 5, 2005. Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CES-D). Descriptive statistics were compiled and prevalence rate ratios were estimated for covariates using generalized linear models with Log link and Poisson distribution assumption.

Results: Of the 525 firefighters (76.9% participation) who completed the questionnaire, 133 (27.0 %) had major depressive symptoms (CES-D scale ≥ 22); 201 (38.3%) reported one or more new onset respiratory symptoms, such as sinus congestion (145 [27.6%]), throat irritation (92 [17.3%]) and asthmatic symptoms (43 [8.2%]). Skin problems were reported by 328 (62.5%) of respondents. In multivariate analyses adjusting for age and gender, depressive symptoms were associated with new onset asthmatic symptoms (prevalence rate ratio [PRR], 1.9; 95% Confidence Interval [CI], 1.2-3.1), skin problems (PRR, 2.1; 95% CI, 1.3-3.3) and low supervisor support (PRR, 1.8; 95% CI, 1.2-2.7). Firefighters housed with their family were less likely to report depressive symptoms (PRR, 0.6; 95% CI, 0.4-1.0) compared to those not living with their family.

Conclusions: New Orleans firefighters involved in response to Hurricane Katrina experienced major depressive symptoms associated with physical symptoms. Follow-up should focus on mental health status, physical morbidity, and social support.

Keywords: Firefighters, occupational health, depressive symptoms, social support, disaster response

Positive Association Between Pregnancy Weight Gain and Childhood Overweight Is Strongest Among Underweight Mothers — United States,1996–2003
9:15 a.m.

Authors: Andrea J. Sharma, M. Cogswell, L. Grummer-Strawn

Background: Studies suggest that both undernutrition and overnutrition during pregnancy can program the developing fetus for later obesity. However, these studies have generally relied on birth weight as an indicator of maternal nutritional status during pregnancy. We examined the association between pregnancy weight gain (PWG) and childhood overweight and whether the association was modified by pre-pregnancy body mass index (BMI) or mediated through birth weight.

Methods: We linked data from the 1995-2003 Pediatric and Pregnancy Nutrition Surveillance Systems for 195,394 low-income children born at ≥37 weeks gestation and aged 2-4 years at the time of this study. Using logistic regression, we estimated predicted probabilities of childhood overweight (age-and-sex-BMI ≥95th percentile) per pound of PWG. We tested a quadratic association between PWG and overweight and an interaction between pre-pregnancy BMI and PWG adjusted for the child's age, sex, race/ethnicity, and residence and the mother's age, height, smoking status, and education.

Results: The positive association between PWG and childhood overweight was non-linear ($p<0.0001$) and strongest among children born to underweight mothers (p for interaction<0.0001). Children born to underweight mothers had the lowest probability of overweight until PWG exceeded 45 lbs. The association between PWG and childhood overweight was attenuated by birth weight but remained statistically significant.

Conclusions: Low PWG was not associated with increased childhood overweight in this population. Excessive PWG was, even among children born to underweight mothers. These findings can be used to strengthen public health efforts to promote prenatal care and reduce childhood overweight.

Keywords: obesity, pregnancy, preschool child, maternal-fetal exchange

Adverse Reactions After Permanent Make-Up Procedures — United States, 2004–2005
9:35 a.m.

Authors: Masja Straetemans, J. Audi, M. Belson, D. Flanders, S. Kieszak, C. Monteilh, K. Schmeichel, C. Rubin

Background: Application of tattoo inks as permanent make-up (PMU) is unregulated in the United States; the number of people receiving PMU is unknown. In February 2003, the U.S. Food and Drug Administration (FDA) began receiving reports of adverse health outcomes (AHOs), including disfiguring allergic reactions, from persons who had undergone facial PMU procedures. FDA asked CDC to investigate the extent and etiology of these AHOs.

Methods: A case was defined as illness characterized by signs and symptoms of inflammation lasting >7 days after a facial PMU procedure. We identified case-patients through FDA reports and by referral from other study participants. We determined risk factors for AHOs by comparing case-patients with matched controls recruited through technicians whose PMU applications resulted in AHOs. We used a novel "case self control" design, including exact conditional logistic regression analyses, to evaluate the association between ink lines and risk for AHOs among persons who had multiple facial sites tattooed.

Results: We identified 92 case-patients from 27 states. All 92 were women (age range: 21–79 years); 53 had multiple sites tattooed. One specific ink line was associated with AHOs. The odds were greater (Odds Ratio (OR) = 7.1, 95% Confidence Interval (CI) =1.4–56.3) for AHOs at sites tattooed with this line compared with sites that were not. Among case-patients and matched controls, 8 (67%) of 12 case-patients and 10 (43%) of 23 controls reported a history of allergies (OR =2.2, 95% CI=0.5–9.4).

Conclusions: One ink line was associated with AHOs. Such outcomes may be more likely to occur among persons who have a history of allergies. These persons should consider consulting their physicians before receiving PMU.

Keywords: tattooing, cosmetics, adverse health outcomes, hypersensitivity, U.S. Food and Drug Administration

Fetal Loss Among Pregnancies Conceived Through Assisted Reproductive Technology — United States, 1999–2002
9:55 a.m.

Authors: Sherry L. Farr, L. Schieve, D. Jamieson

Background: Fetal loss occurs in 30% of pregnancies and may predict future pregnancy success. Understanding timing of fetal loss is necessary to counsel patients during pregnancy. However, large, population-based studies are lacking. CDC's assisted reproductive technology (ART) surveillance system collects data from conception to pregnancy outcome for the approximately 40,000 annual U.S. ART pregnancies.

Methods: Data on 148,494 ART pregnancies conceived from 1999 through 2002 were analyzed in a Cox proportional hazards model to estimate conditional risk of fetal loss stratified by maternal age and ART procedure. Confounders included prior live births, spontaneous abortions and ART procedures, infertility diagnosis, and procedure year. Survival time was the number of days from fertilization to fetal loss. Births, maternal deaths, and induced abortions were censored.

Results: The majority of the ART cohort was white and 48% were under 35 years. Total risk of fetal loss was 28%, but varied by maternal age [22% in women <33 years; 60% in women ≥ 42 years (HR=3.7, 95% CI: 3.5–3.9)]. Risk decreased throughout pregnancy for all women, but increased risk persisted with increasing maternal age. Overall, 59% of fetal losses occurred by six weeks' gestation. Depending on maternal age and ART procedure, conditional risk of fetal loss ranged from 12% to 38% at six weeks' gestation; 3% to 12% at the first trimester; and 1% to 4% after the second trimester.

Conclusions: Over 25% of ART pregnancies resulted in fetal loss, with highest risk among oldest women. Results can be used to counsel ART patients and inform future research on etiology of fetal loss. Based on comparability with smaller studies on naturally-conceived pregnancies, results may be generalizable to other populations.

Keywords: fetal death, pregnancy outcomes, assisted reproductive technology, embryo, gestational age

Wednesday, April 26, 2006
Concurrent Session H2:
Now This Won't Hurt a Bit: Vaccine Preventable Disease
Habersham Room
8:30 a.m.–10:15 a.m.
Moderator: Melinda Wharton

Nothing To Cough At: A Statewide Epidemic of Pertussis — Wisconsin, 2004
8:35 a.m.

Authors: Alexandra P. Newman, J. Davis, J. Berg, G. Gabor, D.Hopfensperger, D. Warshauer, M. Wedig

Background: Despite routine vaccination of children against pertussis, reported pertussis incidence in the United States has increased since 1980. In Wisconsin, an annual average of 229 pertussis cases were reported during 1994–2003. However, >5,600 suspected pertussis illnesses were reported during 2004.

Methods: To describe pertussis epidemiologic features in Wisconsin, we analyzed surveillance data from reported cases, collected using a standardized form, with illness onsets during 2004. We included only reports meeting the CDC confirmed or probable pertussis case definition. Laboratory confirmation was by *Bordetella pertussis* isolation from culture or DNA detection by polymerase chain reaction. Incidence rates (IR) were calculated using Wisconsin census data.

Results: During 2004, 4,814 pertussis cases (and two pertussis-associated deaths) occurred in 69 Wisconsin counties (IR=90/100,000); 42% were laboratory-confirmed. The median age among patients was 15 years (range: 1 week–97 years). Infants aged <6 months had the highest reported incidence (IR=459/100,000) and experienced 50 (46%) of 109 reported hospitalizations. Among patients, 73% were aged >10 years and 38% were adolescents aged 10–19 years (IR=223/100,000). Relative to children aged 5–9 years (IR=149/100,000), infants aged <6 months (risk ratio [RR]=3.1; 95% confidence interval [CI]=2.6–3.7), children aged 2–4 years (RR=1.3; CI=1.1–1.5), and adolescents (RR=1.5; CI=1.4–1.6) each had higher rates of pertussis.

Conclusions: Pertussis was widespread in Wisconsin throughout 2004. Reported incidence and hospitalizations were highest among infants too young to have completed a primary pertussis vaccination series and adolescents whose vaccine-induced immunity was waning. High vaccination rates in preschool-aged children should be maintained, and newly licensed pertussis-containing vaccines for adolescents and adults should help reduce the widespread impact of pertussis and prevent transmission to vulnerable infants.

Keywords: whooping cough, *Bordetella pertussis*, Wisconsin, pertussis vaccine

Invasive Pneumococcal Disease Among HIV-Infected Adults: Impact of Pneumococcal Vaccination and Highly Active Antiretroviral Therapy 8:55 a.m.

Authors: Christina R. Phares, D. Hanson, B. Flannery, E. Teshale, M. Wolfe, A. Schuchat

Background: Pneumococcus is one of the most common bacterial pathogens affecting HIV-infected adults. Guidelines recommend the polysaccharide pneumococcal vaccine (PPV) for HIV-infected adults with ≥200 CD4 cells/µl although the independent effect of PPV in the highly active antiretroviral therapy (HAART) era has not been established. We investigated the impact of PPV and HAART on invasive pneumococcal disease incidence.

Methods: We analyzed observational data collected from 1998–2003 for 24,912 HIV-infected adults participating in the Adult Spectrum of HIV Disease Project. We defined invasive pneumococcal disease as isolation of *Streptococcus pneumoniae* from a normally sterile site. We calculated disease incidence and, using marginal Poisson regression, estimated incidence rate ratios (IRR) and 95% confidence intervals (CI).

Results: We observed 285 episodes of invasive pneumococcal disease during 65,475 person-years of follow-up for an incidence of 4.4 episodes per 1,000 person-years. Incidence of invasive pneumococcal disease was significantly higher for patients with alcoholism (16.9/1,000 person-years), other opportunistic infections (14.8/1,000 person-years), transmission via injection drug use (9.3/1,000 person-years), black race (5.3/1,000 person-years), and lower recent CD4 count (10.0, 7.3, 5.2, and 2.2/1,000 person-years at CD4 counts of <50, 50–199, 200–349, ≥350 cells/µl, respectively). Controlling for age, race, mode of transmission, alcoholism, history of opportunistic infection, and recent CD4 count, receipt of PPV was associated with a 30% decline in the incidence of invasive pneumococcal disease (IRR: 0.7; 95%CI: 0.5−0.9) while prescription of HAART was independently associated with a 50% decrease (IRR: 0.5; 95%CI: 0.4−0.7). The benefit of HAART was consistent across strata of CD4 count.

Conclusions: Among HIV-infected adults, PPV and HAART are independently associated with a lower incidence of invasive pneumococcal disease. Our findings support current guidelines regarding the management of HIV-infect adults.

Keywords: AIDS-related opportunistic infections; antiretroviral therapy, highly active; pneumococcal infections; pneumococcal vaccines

Measles Outbreak in South Africa, 2003–2005 9:15 a.m.

Authors: Meredith L. McMorrow, R. Nandy, G. Gebrehmedin, B. Harris, J. van den Heever, A. Jack, B. Masresha, L. Cairns, P. Strebel, V. Dietz.

Background: Measles was virtually eliminated in South Africa, a nation with high HIV seroprevalence, following accelerated measles control activities in 1996-7. However, from August 2003 – June 2005, 1725 laboratory-confirmed measles cases were reported in South Africa. We conducted an investigation to determine the outbreak's cause and examine the role of HIV.

Methods: We identified all laboratory-confirmed case-patients with addresses reported through facility-based surveillance in Johannesburg Metropolitan District from July 1, 2004 – May 30, 2005, and made home visits to those we could locate. We interviewed case-patients or their caregivers to determine patient vaccination and HIV status, and identified and interviewed additional cases who met the WHO measles clinical case definition.

Results: From July 1, 2004 – May 30, 2005, 203 laboratory-confirmed cases were reported with addresses. Of these, 94 (46.3%) were located; 15 additional cases were identified. Of these 109 case-patients, 57 (52.3%) were hospitalized and 7 (6.4%) had a measles-associated death. Of the 57 case-patients eligible for routine immunization at the time of rash onset, only 27 (47.4%) were vaccinated, 22 (38.6%) were unvaccinated, and 8(14%) had unknown vaccination status. Fourteen (12.8%) case-patients were HIV-infected, 46 (42.2%) were HIV-uninfected, and 49 (45.0%) had unknown HIV status. Vaccine effectiveness was 85.4% (95% CI: 72.5-92.3%) for all case-patients, 62.5% (95% CI: 29.4-80.1%) for HIV-infected, 75% (95% CI: 53.2-86.7%) for HIV-uninfected and 96.4% (95% CI: 92.3-98.3%) for case-patients with unknown HIV status.

Conclusions: This investigation demonstrated that many children were susceptible to measles and that the primary cause of this outbreak was failure to vaccinate all children. In addition, although vaccine effectiveness may have been lower in HIV-infected than uninfected children, population vaccine effectiveness remained high.

Keywords: measles, HIV, vaccines

Reduction in Hepatitis B Virus Seroprevalence Among U.S.-Born Children of Asian Immigrants — Georgia, 2001–2004
9:35 a.m.

Authors: Carrie Shuler, R. Neeman, A. Fiore, B.Bell, W. Kuhnert, S. Watkins, K. Kilgour, K. Arnold

Background: Chronic hepatitis B virus (HBV) infection can lead to liver cancer or cirrhosis, and is more likely the earlier in life infection occurs. Before universal infant HBV vaccination began in 1992, HBV infection prevalence among U.S.-born children of Southeast Asian immigrants in Georgia was 10%–25%. We examined the effectiveness of HBV vaccination programs by measuring prevalence of chronic (surface antigen positive [HBsAg+]) or resolved (core antibody positive [antiHBc+, HBsAg–]) HBV infection in this population.

Methods: Families with one or more immigrant parents from Korea, China, Vietnam, Laos, or Cambodia, and one or more U.S.-born children aged ≥12 months (study children) were eligible. All household members underwent HBV serologic testing and completed a questionnaire about family demographics and vaccination history. We evaluated factors associated with study children's infections (chronic or resolved), adjusting for family members' HBV status.

Results: We enrolled 199 families, including 342 study children. Of 60 children born before 1992, five (8.3%) were infected, including one (1.7%) HBsAg+ child. Of 282 children born in 1992 or later, seven (2.4%) were infected, including two (0.7%) HBsAg+ children. The proportion of children with HBsAg+ family members ranged from 9.9% (Koreans) to 35.4% (Cambodians). After adjusting for this exposure, infection in the child was associated with having a HBsAg+ mother (adjusted odds ratio [AOR]: 11.5; 95% confidence interval [CI] = 3.2–41.2) and with birth before 1992 (AOR: 4.0; 95% CI = 1.1–14.3).

Conclusions: After implementation of universal infant vaccination, HBV prevalence among children of Asian immigrants declined. Routine infant vaccination is protecting U.S.-born children from chronic infection, but older family members still need HBV screening, vaccination, and appropriate medical management.

Keywords: hepatitis B virus, vaccination, children and Southeast Asia

Reemerging Pertussis and the Adult Factor — Colorado, 2004
9:55 a.m.

Authors: Tista S. Ghosh, K. Ledin, J. Patnaik, R.Vogt

Background: In 2004, Tri-County Health Department (TCHD), Colorado's largest local health department, experienced a dramatic increase in pertussis, with 273 confirmed and probable cases (23.8/100,000) as compared with a 5-year median of 112 cases (11.0/100,000). To understand this rise and identify groups at high risk, TCHD examined pertussis rates and cases characteristics during 2004.

Methods: Patients or guardians were interviewed to determine onset, duration, and symptoms using standard questionnaires. Confirmed cases met standard CDC clinical criteria and had positive culture or polymerase chain reaction (PCR) results or were epidemiologically linked to culture- or PCR-positive cases. Probable cases met clinical criteria and had positive serologic tests or a physician diagnosis of pertussis. Incidence rates and case characteristics were analyzed.

Results: Pertussis incidence increased across all age groups, with the largest increase among persons aged 20-39 years (220%). Among adults, incidence was higher for women (15.5/100,000) than men (7.6/100,000), with a greater increase among women of childbearing age. Adult cases were more likely to be female than non-adult cases (odds ratio [OR]=2.2; 95% confidence interval [CI]=1.3–3.6). Symptoms among adults were as severe as symptoms among children. Adults were less likely to have laboratory testing (OR=0.31; CI=0.18–0.53), and to have a longer delay between onset and report to TCHD (p=0.03).

Conclusions: This analysis demonstrates an increase in reported pertussis incidence among adults, particularly women, and adds to the growing evidence that adults with pertussis can suffer substantial morbidity. The Advisory Committee on Immunization Practices (ACIP) recently recommended tetanus-diphtheria-acellular-pertussis (Tdap) vaccine for adults. Adopting this recommendation can help protect adults, but further efforts are needed to improve recognition of adult pertussis, particularly among women.

Keywords: pertussis, high-risk groups, Colorado, adult vaccinations

Wednesday, April 26, 2006
Concurrent Session I1: Give Kids a Chance: Child and Adolescent Health
Grand Ballroom
10:30 a.m.–12:15 p.m.
Moderator: Robin Ikeda

Methamphetamine Use Is Independently Associated with Risky Sexual Behaviors and Adolescent Pregnancy
10:35 a.m.

Authors: Lauren B. Zapata, S. Hillis, P. Marchbanks, K. Curtis, R. Lowry

Background: Youth substance use is known to be associated with risky sexual behaviors, but the independent effect of methamphetamine use on risky sexual behaviors and adolescent pregnancy is unknown. Understanding this relationship is important given that a substantial proportion of U.S. youth report methamphetamine use each year.

Methods: We analyzed data from the 2003 national Youth Risk Behavior Survey (YRBS), a nationally representative sample of 15,240 high school students. To examine whether ever using methamphetamines was associated with recent (during the past three months) risky sexual behaviors and ever being pregnant or getting someone pregnant, we calculated adjusted odds ratios (AORs) among the total sample and stratified by sex. We adjusted for demographic characteristics and ever using cigarettes, marijuana, illegal injection drugs, and other illicit drugs.

Results: In 2003, 7.6% of students reported ever using methamphetamines. Compared with youth who had never used methamphetamines, ever-users were more likely to report recently having sexual intercourse (70.4% versus 31.4%); recently having multiple sexual partners (34.9% versus 7.3%); and ever being pregnant or getting someone pregnant (18.0% versus 3.1%). After adjustment, we found that ever using methamphetamines was independently associated with recent sexual intercourse (AOR=1.6, 95%CI=1.3-2.4); recently having ≥2 sexual partners (AOR=2.2, 95%CI=1.6-3.2); and ever being pregnant or getting someone pregnant (AOR=2.0, 95%CI=1.3-2.9). Among males who reported recently having sexual intercourse, but not females, those who had ever used methamphetamines were more likely to report not using condoms during the last intercourse (AOR=1.5, 95% CI=1.1, 2.1).

Conclusions: Methamphetamine use is independently associated with risky sexual behaviors and adolescent pregnancy, even after adjusting for other substance use behaviors.

Keywords: methamphetamine, youth, sexual behavior, adolescent pregnancy, condom use

Outpatient Pediatric Adverse Drug Events: Results from a National Surveillance System, 2004
10:55 a.m.

Authors: Adam L. Cohen, D. Jernigan, D. Pollock, D. Budnitz

Background: Little is known about the type and severity of adverse drug events (ADEs) that affect children and adolescents outside of hospital settings. Our objective was to estimate and describe the national public health burden of outpatient pediatric adverse drug events.

Methods: We conducted active surveillance through the National Electronic Injury Surveillance System–Cooperative Adverse Drug Event Surveillance project, a national stratified probability sample of 64 U.S. hospitals. Subjects were patients 18 years or younger presenting to emergency departments with ADEs from January 1 to December 31, 2004. We estimated the number, type, treatment, and patient characteristics of ADEs nationwide.

Results: In 2004, an estimated 154,853 [95% confidence interval 113,942-195,764] patients 18 years or younger were diagnosed and treated in emergency departments for ADEs. Nearly half (49.2%) occurred in patients aged 1-4 years, and 12.8% occurred in infants <1 year of age. Accidental overdoses were the most common type of ADE (44.6%), followed by allergic reactions (28.8%) and side effects (17.3%). Children 1-4 years of age presented most commonly with accidental overdoses (66.8%). Antimicrobials, analgesics (including acetaminophen, nonsteroidal anti-inflammatory drugs, and narcotics) and psychotropic medications (including antidepressants, antipsychotics, stimulants, and sedatives) accounted for nearly half of ADEs (25.1%, 13.6% and 10.2%, respectively). Most ADEs (90.2%) did not require hospitalization or extended observation. Cardiovascular medications (including antihypertensives, antihyperlipidemic agents, and anticoagulants), psychotropic medications, and analgesics accounted for the highest percentage of hospitalizations (16.6%, 15.8% and 14.4%, respectively).

Conclusions: Outpatient ADEs pose a significant pediatric health burden in the U.S. Interventions targeting accidental overdoses of commonly prescribed medications would likely have the highest impact in reducing emergency department visits and hospitalizations from outpatient ADEs.

Keywords: medication errors; adverse drug reaction reporting systems; drug eruptions; safety management; ambulatory care; emergency service, hospital

Health Seeking Behavior for Respiratory Illness Among Young Children in a Rural African Setting — Kenya, 2005
11:15 a.m.

Authors: Deron C. Burton, B. Onyango, C. Larson, J. Alaii, B. Flannery, E. Zell, M. Hamel, R. Breiman, D. Feikin

Background: Acute respiratory infections kill two million children in developing countries annually. Respiratory infection surveillance in developing countries is conducted at healthcare facilities that perform etiologic testing. Understanding local health seeking behaviors is critical to assessing the completeness of facility-based surveillance. We sought to determine the proportion of young children with pneumonia-like illness seeking facility-based care in rural Kenya.

Methods: In Bondo District, Kenya, we systematically sampled 35 of 686 census-defined enumeration areas and interviewed all households with a child < 5 years. We collected information about household characteristics and health seeking behaviors associated with episodes of possible pneumonia, defined as cough and difficulty breathing for more than two days or healthcare worker-diagnosed pneumonia, during the prior 12 months. We calculated proportions and 95% confidence intervals (CIs) using SUDAAN.

Results: Of 2,810 households visited, 1,084 (39%) included children < 5 years; of those, 1,056 (97%) participated. Thirteen percent (222 of 1,679) children < 5 years had possible pneumonia; 173 of these had complete surveys. Overall, 155 (90%; CI 83-94%) sought care outside the household. 93 (54%; CI 46-61%) visited a health facility, and 21 (12%; CI 8-18%) were hospitalized. Other common sites of health seeking were drug sellers (34%; CI 27-42%), private providers (23%; CI 16-30%), and traditional healers or health volunteers (8%; CI 4-13%). Children in households with higher socioeconomic status were more likely to have visited a health facility than poorer children (63% vs 46%; p=0.02).

Conclusions: In rural African settings, facility-based surveillance likely underestimates the true burden of respiratory infectious diseases, particularly in poorer communities. To improve detection of respiratory infections, facility-based surveillance should be supplemented with surveillance through other local providers.

Keywords: pneumonia, surveillance, infectious diseases, emerging

Evaluation of Student-Run Suicide Prevention Awareness Campaigns in Schools — Washington, 2004
11:35 a.m.

Authors: Jonathan H. Siekmann, J. Sabel, L. Bensley, D. Ruggles, J. VanEenwyk

Background: Suicide is the second-leading cause of death for Washingtonians aged 10–18 years. One component of the Washington State Youth Suicide Prevention Program (YSPP) provides resources and assistance for student-run suicide prevention awareness campaigns in schools, which consist of posters, presentations, and the use of outside experts. During the 2003-04 school year, students at participating schools chose which YSPP resources to utilize. We evaluated effects of these tailored, diverse campaigns on suicidal thoughts and behaviors.

Methods: Using the Healthy Youth Survey (HYS), administered in fall 2004 in Washington schools, we compared student responses in 40 high and 19 middle schools with YSPP to 566 non-YSPP schools on suicide contemplation, plans, attempts, injury from attempts, and likelihood of seeking help in the previous 12 months, controlling for race, socioeconomic factors, rural geographic location, and substance abuse. We used logistic regression to compute adjusted odds ratios. Among schools that did not participate in YSPP in 2001-02, we compared changes in 10th grade suicide attempts from 2002 to 2004.

Results: After controlling for potential confounders, there were no significant differences in suicidal thoughts and behaviors between YSPP and non-YSPP schools in 2004. There was also no decrease in reported suicide attempts at schools with YSPP in 2003-04 only, compared to schools without YSPP in both school years.

Conclusions: Our inability to detect positive effects of these campaigns might result from program quality, including content, scope and duration. Inclusion of students at YSPP schools who might not have participated in YSPP activities likely biased the findings toward the null. To address this latter limitation, we recommend including questions on future HYSs to better gauge exposure to the program.

Keywords: adolescent, suicide, program evaluation, Washington

Wednesday, April 26, 2006
Concurrent Session I2: Resistance is Futile: Drug - Resistant Infection
Habersham Room
10:30 a.m.–12:15 p.m.
Moderator: Chris Van Beneden and Daniel B. Jernigan

New Prospectives for Control of Multidrug-Resistant *Shigella sonnei* Infection Among Pediatric Populations — Kentucky, 2005
10:35 a.m.

Authors: Nato Tarkhashvili, T. Sugg, D. Thoroughman, K. Humbaugh

Background: *Shigella sonnei* infection, caused by strains resistant to ampicillin and trimethoprim-sulfamethoxazole, has become more common. During May–October 2005, 160 *Shigella sonnei* cases were reported from county X (baseline = 7/year) to the Kentucky Department for Public Health. The outbreak-related strain circulated primarily among child care attendees and was resistant to these two antibiotics. We investigated the outbreak and evaluated traditional control measures for pediatric shigellosis including a requirement for two negative stool cultures for child care readmission.

Methods: A case of pediatric shigellosis was defined as a diarrheal illness in a county X resident aged 0–17, with laboratory-confirmed *Shigella sonnei* from a stool specimen and with date of onset during May 1–October 31, 2005. Characteristics of patients were obtained from surveillance and medical records, including age, sex, date of onset, date of specimen collection, antibiotic(s) used, dates of repeat stool culture submission, and repeat culture results.

Results: We identified 135 pediatric cases; 65 (48%) were female. Azithromycin eradicated Shigella in all 34 patients treated; empirically prescribed trimethoprim-sulfamethoxazole failed in 4/5 (80%) cases (risk ratio: undefined; 95% confidence interval = 7.0–undefined; $p<0.01$). In 42 repeat stool cultures conducted after one negative stool culture, none were positive for *Shigella*, regardless of time interval between cultures (range: 1–13 days). Antimicrobial susceptibility results were available for 12 isolates; all were resistant to ampicillin and trimethoprim-sulfamethoxazole.

Conclusions: The traditional requirement for two negative stool cultures for readmission into a child care setting after *Shigella* infection should be evaluated. Azithromycin might be considered as an alternative treatment, but methods for routine testing of *Shigella* strains for susceptibility to this agent have not been standardized.

Keywords: *Shigella sonnei*, child care, azithromycin, readmission

Emergence of Sulfonamide-Resistant *Nocardia* Infections — Alabama, 2000–2004
10:55 a.m.

Authors: Kristin B. Uhde, J. Brown, A. Steigerwalt, R. Morey, S. Shadomy, N. Robinson, C. Dykewicz

Background: *Nocardia* species are gram-positive aerobic actinomycetes that are ubiquitous in soil and water, and can cause severe infections. Sulfonamides have been the traditional treatment of choice for nocardiosis, but increasing sulfa resistance has been reported recently internationally. *Nocardia* antibiotic susceptibility testing and speciation are not routinely performed, but in Alabama, the Department of Health offered susceptibility testing to private physicians, hospitals, clinics, and public health departments for patients with a culture confirmed *Nocardia spp*. infection.

Methods: *Nocardia* isolates obtained from Alabama patients with culture-confirmed nocardiosis were submitted to CDC for antibiotic susceptibility testing at the request of the treating physicians. We speciated and evaluated all Alabama isolates using 16S rRNA gene sequencing and antibiotic susceptibility and biochemical profiles.

Results: Seventy-two isolates were submitted from 1/2000–12/2004. Eighteen previously identified *Nocardia* species and two species (*N. takedensis* and *N. tenerifensis*) never before isolated from humans in the U.S. were identified. Forty-nine (68%) of 72 isolates were resistant to sulfonamides. The most common isolate was *N. nova*, with 32 (44%). A total of 27 (84%) of 32 *N. nova* isolates were resistant to sulfonamides compared to 22 (55%) of 40 other *Nocardia* species [Fisher's Exact p-value=0.007].

Conclusions: The proportion of sulfonamide resistant *Nocardia* isolates from Alabama is the highest ever recorded in the U.S. Further studies are needed to evaluate whether the emergence of sulfa-resistant *Nocardia* is associated with worsening patient outcomes, and whether it is still appropriate to recommend empiric treatment with sulfa-containing antibiotics. This evaluation shows the importance of implementing antibiotic susceptibility testing and speciation of Nocardia clinical isolates.

Keywords: *Nocardia* infections, sulfonamides, antibiotic resistant, speciation

Perinatal Sepsis Caused by *Staphylococcus aureus* — Soweto, South Africa, 2004
11:15 a.m.

Authors: Roopal M. Patel, M.C. Thigpen, C.L. Cutland, W. Jassat, M.J. Groome, S.C. Velaphi, M. Khoosal, J. Wadula, S.J. Schrag, S.A. Madhi

Background: Perinatal sepsis is an important cause of infant mortality in sub-Saharan Africa. *Staphylococcus aureus* is an uncommon cause of perinatal sepsis that may be emerging in countries with high prevalence of maternal HIV infection.

Methods: In 2004, we conducted active laboratory surveillance for culture-confirmed invasive infections in hospitalized neonates at Chris Hani Baragwanath Hospital (CHBH), in Soweto, South Africa. We calculated incidence from Gauteng Health Information Systems 2004 birth statistics. We defined early-onset neonatal sepsis (EOS) as isolation of a microorganism from a normally sterile site within the first three days of life.

Results: EOS was identified in 117 neonates (4.2/1000 live births) in 2004. *Staphylococcus aureus* was the second leading cause of EOS (0.5/1000 live births) after group B *streptococcus* (1.3/1000 live births). Of the fifteen *S. aureus* EOS cases, seven occurred on day 0 and two on day 1. The median birth weight was 1870 grams; 66% (8/12) were born at <37 weeks gestation. Eighty percent of the infants with S. aureus EOS were low birth weight (LBW) compared to 14.5 % of all Soweto-born infants ($p<0.001$). Eight (73%) of the eleven infants with known HIV exposure were born to HIV+ mothers, higher than the HIV seroprevalence among Soweto antenatal clinic attendants (27%; $p=0.002$). Forty percent (6/15) were infected with methicillin-resistant *S. aureus* (MRSA).

Conclusions: *S. aureus* including MRSA is a common cause of EOS in Soweto, South Africa, particularly among premature, LBW infants of HIV-infected mothers. The timing of culture confirmation suggests vertical transmission. Additional surveillance is needed to characterize risk factors for perinatal *S. aureus* infections and to assess incidence of these infections in areas of high HIV prevalence.

Keywords: neonates, Sepsis, *Staphyloccocus aureus*, vertical transmission

Antimicrobial Resistance Pattern of *Shigella sonnei* — Kansas, 1997–2004
11:35 a.m.

Authors: Angela S. Huang, R. Flahart, J. Sexton, D. C. Hunt, G. Hansen

Background: Approximately 20,000 cases of shigellosis are reported in the United States annually. When indicated, the Centers for Disease Control and Prevention recommend trimethoprim-sulfamethoxazole for susceptible organisms acquired in the United States. During recent decades, *Shigella sonnei* has developed resistance to this antibiotic worldwide. However, limited information about drug resistance patterns at local, state, or national levels is available. Understanding the antimicrobial resistance patterns of *S. sonnei* is important for empiric treatment recommendations and to prevent increases in antibiotic-resistant infections.

Methods: Kansas laboratories are required by law to submit all *Shigella spp.* isolates to the Kansas Department of Health and Environment (KDHE) Laboratory. The state laboratory identifies and analyzes resistance to antibiotics, including trimethoprim-sulfamethoxazole, ampicillin, ampicillin-sulbactam, chloramphenicol, ciprofloxacin, and gentamicin. Data collected for January 1997–December 2004 were analyzed, and proportions of drug resistance compared.

Results: Of the 602 *Shigella* isolates submitted during 1997–2004, a total of 537 (89%) were *S. sonnei*, and 65 (11%) were *Shigella flexneri*. Because *S. flexneri* causes a limited proportion of shigellosis in Kansas, this analysis focuses on *S. sonnei*. For *S. sonnei*, 268 (50%) were resistant to trimethoprim-sulfamethoxazole, 412 (77%) to ampicillin, 150 (28%) to ampicillin-sulbactam, and one (<1%) to chloramphenicol. No isolates were resistant to ciprofloxacin or gentamicin.

Conclusions: Resistance to trimethoprim-sulfamethoxazole occurs in 50% of the *S. sonnei* isolates in Kansas. In 2000, KDHE recommended limited use of ampicillin because of antibiotic resistance during an *S. sonnei* outbreak. This study indicates that similar recommendations might be needed for trimethoprim-sulfamethoxazole. To effectively minimize further development of antimicrobial resistance, judicious use of antibiotics and increased awareness of changing antibiotic resistance patterns of *S. sonnei* is needed.

Keywords: *Shigella*, drug resistance, diarrhea

When Good Drugs Don't Work: The Role of Macrolide Resistance In Breakthrough Pneumococcal Bacteremia — United States, 2001-2003
11:55 a.m.

Authors: Gavin B. Grant, N. Barrett, N. Bennett, K. Gershman, R. Lynfield, S. Ray, W. Schaffner, A. Roberson, M. Kyaw, C. Greene, C. Whitney

Background: Approximately 37,000 people had invasive pneumococcal disease in the United States in 2004. While macrolide antibiotics (e.g., clarithromycin and azithromycin) are standard therapy, resistance may lead to treatment failures. We studied the association between macrolide treatment failure and resistance in adults with pneumococcal bacteremia.

Methods: We identified cases from six Active Bacterial Core surveillance sites during 2001-2003. A case was defined as pneumococcal bacteremia without sequestered infections (e.g., meningitis) and resistance results available; treatment failure was development of bacteremia while taking a macrolide. We obtained clinical data including antibiotic use from chart review and provider and patient/proxy interviews, and excluded persons who used only non-macrolide antibiotics or were missing data. We used odds ratios to compare macrolide resistance (minimum inhibitory concentration [MIC] >1 µg/ml) in three groups: macrolide use at diagnosis (M-ON), use 4 to 90 days before diagnosis (M-90D) and no use within 90 days (NoABX).

Results: Of 1543 cases, we excluded those missing antibiotic use data (n=528) or using only non-macrolide antibiotics (n=234). Of the remaining 781, 26 were M-ON, 34 were M-90D, and 721 were NoABX. Pneumococci from M-ON cases were more likely to be resistant than M-90D (81% vs. 44%, odds ratio [OR]=5.3, 95% Confidence Interval [CI]: 1.6-17.4) and NoABX pneumococci (81% vs. 14%, OR=26.4, CI: 9.7-71.6). Of the M-ON pneumococci, 39% had MICs in the range previously associated with clinical failure (MIC>16 µg/ml) compared to 32% and 6% of the M90D and NoABX groups.

Conclusions: The greater prevalence of resistant pneumococci among persons with bacteremia while taking macrolides suggests that resistance contributes to treatment failure. Alternative antibiotic treatment may be necessary for those with current macrolide use.

Keywords: *Streptococcus pneumoniae*; drug resistance, bacterial

Monday - Friday Poster Session
Meet The Authors
Grand Ballroom
12:30 p.m. - 1:30 p.m.
Posters 16 - 31

Poster 16
Use of Classification and Regression Tree (CART) Analysis To Develop a Diagnostic Decision Tree To Detect Tuberculosis Among Sputum Smear-Negative HIV-Infected Persons — Botswana

Authors: Sekai R. Chideya, K. Laserson, K. Tan, E. Talbot, J. Varma, K. Cain, T. Samandari, R. Mwansa, C. Wells

Background: Tuberculosis (TB) is the leading cause of death in persons living with AIDS. TB diagnosis relies on symptoms, radiography, and acid-fast bacilli identified on sputum smears. Sputum smears have 40–70% sensitivity and >90% specificity for TB disease overall, but sensitivity is decreased in HIV–infected persons. More sensitive tests, such as culture, are generally unavailable in resource-constrained settings. A diagnostic algorithm to detect TB among smear-negative HIV-infected patients living in resource-constrained settings is needed. We sought to generate an algorithm among such patients in Botswana, where 60–80% of TB patients are HIV infected.

Methods: We evaluated demographic, clinical and diagnostic data (including symptoms of cough) from a prospectively-enrolled cohort of inpatient and outpatient TB identified from 2001–2002 during a previous clinical study. We used classification and regression tree (CART) methodology to analyze multiple predictors of TB disease and generate a decision tree. We defined TB disease as being sputum or blood culture positive, and calculated the tree's sensitivity and specificity compared to culture.

Results: Of 465 enrolled patients, 276 (59%) were smear-negative and HIV infected. Of 29 variables evaluated, those acting as critical branch points in the decision tree included hemoglobin, asthma, age, sex, night sweats, history of pneumonia, history of TB, percent neutrophils, headache, exposure to TB, and lymphocyte count. The algorithm's sensitivity was 84.6% (95% CI=71.4-92.7%) and specificity was 49.7% (95% CI=42.8-56.7%).

Conclusions: Using CART analysis we developed an algorithm for TB diagnosis among smear-negative HIV-infected persons that shows higher sensitivity, but lower specificity, compared to sputum smears. Further study is needed to determine the utility of this algorithm when applied to populations having high HIV prevalence.

Keywords: classification and regression tree analysis, tuberculosis, diagnosis, HIV, smear-negative

Note: Dr. R. Mwansa, who made significant contributions to the study, is now deceased.

Poster 17
Early Clinical Toxicity to Highly Active Antiretroviral Therapy in a Home-Based AIDS Care Program in Rural Uganda

Authors: Fatu M. Forna, C. Leichty, P. Solberg, F. Asiimwe, W. Were, J. Mermin, P. Behumbiize, T. Tong, J.T. Brooks, P. Weidle

Background: Antiretroviral therapy (ART) benefits HIV-infected persons, but also exposes them to toxicities. We evaluated the early toxicity of ART in a home-based AIDS care project in rural Uganda.

Methods: From May 2003 to December 2004, patients with symptomatic HIV disease or CD4 cell count ≤ 250 cells/μL were treated with stavudine, lamivudine, and either nevirapine or efavirenz, and evaluated for incident clinical toxicities. Toxicities were graded 1 to 4 (grades 3-4 = severe) and cumulative Kaplan-Meier probabilities were calculated. Cox proportional hazards modeling was used to calculate multivariate-adjusted hazard ratios (HR).

Results: 1,037 ART-naïve adults (73% women, median CD4 cell count: 126 cells/μL) started ART, contributing 11,395.2 person-months of observation. 414 patients (40%) developed 547 clinical toxicities (incidence rate 4.47/100 person-months) including neuropathy (325 patients), and rash (59 patients). The probabilities of remaining free from toxicity at 6, 12, and 18 months were 0.76, 0.59, and 0.47 for any toxicity and 0.92, 0.86, and 0.84 for severe toxicity, respectively. 220 patients (21%) had 225 drug changes due to toxicity. The probabilities of remaining on the original regimen without change for toxicity at 6, 12, and 18 months were 0.91, 0.78, and 0.68, respectively. Age ≥ 35 years was associated with increased hazard of any (HR 1.72; 95% Confidence Interval [CI]: 1.38, 2.16) and severe toxicity (HR 1.82; 95%CI: 1.22, 2.71).

Conclusions: Clinically apparent toxicities were common, but the probability of severe clinical toxicity was moderate. Neuropathy and rash accounted for most events, and required single-drug substitutions in many cases. In resource-limited settings, ART intolerance to a regimen containing stavudine and nevirapine presents a manageable barrier to care though more tolerable regimens would be desirable.

Keywords: antiretroviral therapy, toxicity, side effects, Africa, Uganda, rural

Poster 18
Hospital Utilization for Pneumonia in Rural Thailand

Authors: Hannah T. Jordan, P. Prapasiri, B. Clague, S. Anand, S. Sutthirattana, B. Flannery, S.J. Olsen

Background: Pneumonia is the leading infectious cause of mortality in Thailand. In 2003, active surveillance for pneumonia was established at hospitals in Nakhon Phanom province to estimate disease burden and inform decisions regarding vaccine introduction. We conducted a community survey to describe health-care utilization and estimate the percentage of pneumonia episodes captured through surveillance.

Methods: In 40 villages selected using probability proportional to size, we surveyed residents of 2000 households. Trained interviewers administered standardized questionnaires using handheld computers. Household members were asked about probable pneumonia (dyspnea and cough for >2 days or physician-diagnosed pneumonia) during the preceding 12 months and care sought for each pneumonia episode. Analyses accounting for clustered design were conducted using EpiInfo.

Results: Among 7,723 residents surveyed, 137 (1.8%, 95% confidence interval 1.4-2.1%) had probable pneumonia, with 72 (53%) episodes reported during July through October, the peak period of pneumonia hospitalizations. Children <5 years were more likely to have had probable pneumonia than adults 15-74 years (10% versus 1%, p<0.001), but were equally likely to seek care for probable pneumonia at a hospital (53% versus 69%, p=0.10). Overall 132 (96%) residents with probable pneumonia sought medical care, most commonly at hospitals (61% of 132) and private clinics (33%). Seeking care at a hospital was not associated with gender or monthly household income. Residents with probable pneumonia who sought hospital care had longer duration of illness than those who sought care elsewhere (7 days versus 5, p<0.001).

Conclusions: Most Nakhon Phanom residents seek care for pneumonia at healthcare facilities. Hospital-based surveillance, which likely captures severe pneumonia, is representative of illness in the general population and can be used to guide public-health decision-making.

Keywords: pneumonia, surveillance, community survey, Thailand

Poster 19
Who Gets Influenza Pneumonia in Thailand?

Authors: Mark A. Katz, P. Tharmaphornpilas, S. Chantra, J.M. Simmerman, T.M. Uyeki, S.F. Dowell, S.J. Olsen

Background: Policymakers in Thailand are considering adopting national influenza vaccination guidelines targeting high-risk groups for influenza-related morbidity and mortality. Although risk factors for influenza complications in temperate climates have been described, no studies have addressed these factors in Thailand.

Methods: We evaluated risk factors for severe influenza in Thailand by examining data for patients hospitalized with laboratory-confirmed influenza pneumonia. Data were obtained from a population-based pneumonia surveillance system in Sa Kaeo Province in rural eastern Thailand. Influenza was diagnosed by culture, RT-PCR, and hemagglutinin inhibition antibody testing of paired sera. We compared case-patients with the Sa Kaeo population, using census data to compare age, and with the general Thai population, using national survey data to evaluate the effect of chronic diseases.

Results: From September 2003 to August 2004, 80 patients hospitalized with influenza pneumonia were identified. Compared with the Sa Kaeo population, the proportion of cases among children ≤1 year old was 6.2 times higher than expected [10.1% vs. 1.3%, 95% Confidence Interval, 2.2-14.1], and the proportion of cases among people > 75 years old was 11.1 times higher than expected (13.9% vs. 1.4%, 95% CI, 5.3-21.1). Compared with the national population, case-patients were 15.1 times (22.8% vs. 2.2%) more likely to have chronic respiratory disease, 4.8 times (17.7% vs. 4.3%) more likely to have chronic cardiovascular disease, and 7.0 (34.1% vs. 6.9%) more likely to have been hospitalized during the previous year.

Conclusions: In Sa Kaeo, Thailand, infants, the elderly, people with chronic respiratory and cardiovascular disease, and people hospitalized in the previous year were at high risk for influenza pneumonia requiring hospitalization. These findings could help guide national influenza vaccination recommendations in Thailand.

Keywords: Thailand, influenza, pneumonia, hospitalization, risk factors

Poster 20
Famine or No Famine? — Niger, 2005

Authors: Avid Reza, B. Tomczyk, V. Aguayo, M. Anderson, L. Talley, C. Blanton

Background: Media-reported famine conditions in Niger during 2005 were based on information from local nutrition surveys, perceived food shortages by the World Food Program, and increasing food prices. However, it was unclear if the situation met the U.S. Agency for International Development's criteria for famine, defined as prevalence of global acute malnutrition (GAM) >20%, a crude mortality rate (CMR) >1/10,000 persons/day, and presence of food security indicators such as use of extreme coping strategies (e.g., selling land). Determining whether famine or a lesser crisis existed in Niger would help ensure a proportionate and timely response. Consequently, the United Nations Children's Fund asked CDC to conduct a national nutrition survey to assess the magnitude of the problem.

Methods: During September–October 2005, we conducted a 26-cluster by 20-household survey in Niger to estimate malnutrition and mortality. We collected weight and height measurements for children aged 6–59 months and administered a questionnaire assessing food security to caregivers of children aged <5 years.

Results: Overall, 15% (95% CI, 13.9–16.8) of children aged 6–59 months were acutely malnourished; GAM prevalence by region ranged from 9% to18%. The national CMR was 0.4/10,000/day (95% CI, 0.4–2.3) (regional variation: 0.2–0.7/10,000/day). Seventy-eight percent of caregivers reported food shortages, but only 23% relied on extreme coping strategies.

Conclusions: These results indicate that the crisis did not reach the threshold for a famine. GAM and CMR estimates were below famine criteria; despite reported food shortages, most caregivers had not resorted to coping strategies suggestive of famine conditions. Malnutrition rates, however, exceeded the emergency threshold of 10%. A strong humanitarian response is needed to avoid worsening the crisis.

Keywords: malnutrition, starvation, famine, Niger

Poster 21
Distribution of Free Bed Nets Bundled with Insecticide Through an Integrated Child Health Campaign — Lindi Region of the United Republic of Tanzania, 2005

Authors: Jacek Skarbinski, J. Massaga, A. Rowe, P. Kachur, P. Bloland, J. Zhong

Background: Malaria is a leading cause of mortality in sub-Saharan Africa. Use of insecticide-treated bednets (ITNs), a proven intervention to prevent malaria mortality, continues to be low, and new distribution strategies are needed. From July 30 to August 1, 2005, the Tanzanian Ministry of Health and UNICEF conducted an integrated health campaign with free distribution of untreated bednets bundled with insecticide, measles vaccination, and mebendazole and vitamin A administration for children under five years old in Lindi, Tanzania. For maximum benefit, bednets needed to be treated with the provided insecticide by the recipient at home.

Methods: To assess intervention coverage three months after the campaign, a community-based cross-sectional cluster survey was conducted from November 2–16, 2005. Thirty enumeration areas (EAs) were selected using probability proportional to estimated size, households in each EA were mapped, and twenty households per EA were randomly selected for participation

Results: A total of 574 households with 354 children under five were visited, and 79.6% of eligible children received a bednet. Because of the campaign, overall household ownership of any bednet increased from 53.0% to 69.3%, ownership of a treated net increased from 13.3% to 24.7% and the equity ratio increased from 0.68 to 0.97. Caretakers reported that 46.3% of children slept under any bednet the previous night and 21.5% slept under a treated net; 35.9% slept under a net obtained from this campaign while 17.7% slept under a treated campaign net.

Conclusions: Integrating malaria prevention activities with immunization campaigns can rapidly and equitably increase bednet possession and use and merits continued large-scale implementation. Further education on treating bednets with insecticide and promoting ITN use is needed.

Keywords: malaria, insecticide treated bednets, measles vaccination, delivery of care, Tanzania

Poster 22
Emergency Department-Based Syndromic Surveillance System for Meningitis and Encephalitis — Maricopa County, Arizona, 2004

Authors: Nelson Arboleda, A. Fleischauer, J. Sejvar, A. Diggs, M. Schumacher, S. Santana, D. Engelthaler, K. Komatsu, S.Hughes, G. Jones, L. Hutwagner

Background: Syndromic surveillance, the collection and analysis of clinical information preceding diagnosis, is used by > 100 State and local health departments to detect and respond to outbreaks. Evaluations of syndromic surveillance have assessed respiratory and gastrointestinal case definitions; while rare syndromes have not been validated. We evaluate a Meningitis and Encephalitis (M/E) syndrome case definition for its ability to detect West Nile Virus (WNV) and aseptic meningitis outbreaks.

Methods: Medical records were reviewed for a total of 570 (60%) of 948 reported M/E cases (Maricopa County, Arizona, April - November 2005). Abstracted data included ED visit date and time, age, gender, chief complaint and discharge diagnosis. Alternate M/E case definitions were created based on variations of chief complaint combinations from 12 facilities. Subsequently aberration detection was performed for each case definition from 5 facilities with complete electronic ED data (i.e., all patients visiting the ED) to determine sensitivity, specificity, and timeliness of WNV and aseptic meningitis case detection.

Results: Sensitivity ranged from 18% to 71% (specificity; 98% to 99%) for five alternate case definitions. Three of five case definitions produced a significant increase (signal) prior to the confirmation of the initial WNV case by laboratory methods. One case definition (18% sensitivity, 99% specificity) produced a signal 4 weeks prior to the WNV outbreak and also signaled the peak of the concurrent aseptic meningitis outbreak.

Conclusions: Maricopa County retrospectively implemented electronic ED-based syndromic surveillance to rapidly detect the start of the 2005 WNV outbreak amidst an ongoing aseptic meningitis outbreak. One case definition produced multiple signals prior to traditional surveillance methods. This case definition can be standardized in syndromic surveillance for rapid detection of neuro-infectious outcomes.

Keywords: syndromic surveillance, outbreak detection, WNV, meningitis, encephalitis

Poster 23
Outbreak of Q Fever at a Horse-Boarding Ranch with a Goat Herd — Pueblo County, Colorado, 2005

Authors: Wendy M. Bamberg, J. Pape, C. Nevin-Woods, A. Daniels, W. Ray, C. Adamson, M. Mazur, J.L. Beebe, J. Nucci, G. Waidmann, F. Jabola, K. Gershman

Background: Q fever is a zoonotic disease caused by *Coxiella burnetii*. Organisms are shed in birth products of ruminants and survive for months in the environment. Human infection can result in prolonged flu-like illness or rarely, endocarditis. In September 2005, Q fever was identified among persons who boarded horses or worked on a ranch with >300 goats.

Methods: We conducted a cohort study of horse boarders and ranchers and an environmental investigation. A case was defined using standard CDC serologic criteria. Vaginal and milk samples from goats and soil samples were tested by using polymerase chain reaction and time-resolved fluorescence immunoassay and were considered positive if both tests were reactive.

Results: We interviewed 66 (97%) of 68 horse boarders and ranchers; 22 (33%) had contact with newborn or birthing goats. Thirty-eight (58%) were tested, of whom 20 (52%) met the case definition. Ten (50%) were symptomatic; no patient died or was hospitalized. Risk factors for infection included contact with stillbirths or goats that died (risk ratio [RR]=2.3; 95% confidence interval [CI]=1.2–4.2), contact with newborn goats (RR=2.3; CI=1.2–4.3), birthing goats (RR=2.4; CI=1.6–3.6), feeding goats (RR=2.1; CI=1.0-4.3), and vaccinating goats (RR=2.3; CI=1.4–3.8). Two (4%) of 51 goats and nine (23%) of 40 soil samples tested positive for *C. burnetii.*

Conclusions: Contact with goats was the most likely source of *C. burnetii* infection; exposure to contaminated soil might have contributed. An unusual feature of this outbreak is the number of persons who were exposed to newborn or birthing goats. Laypersons should not participate in the birthing process of goats; professionals who require exposure to birthing goats should be educated on reducing their infection risk.

Keywords: Q fever, *Coxiella burnetii*, zoonoses, goats, environmental microbiology

Poster 24
Epidemiology of Human Rabies in the United States, 1997–2004

Authors: Alice S. Chapman, C. Hanlon, J. McQuiston, M. Niezgoda, L. Orciari, D. Swerdlow, C. Rupprecht

Background: Ante-mortem diagnosis of rabies is difficult due to the nonspecific prodromal clinical signs and frequent lack of exposure history. Understanding the clinical presentation in patients with encephalitis who are later found to have rabies may be useful to guide physicians in the initial differential diagnosis. Early diagnosis of rabies is also important to minimize exposure and prevent additional cases, and it presents a potential opportunity for therapy in light of one patient's survival in 2004.

Methods: We analyzed clinical and demographic data from 24 rabies cases diagnosed during 1997-2004. We compared the clinical findings to those of 161 cases referred to CDC during the same period but for which rabies was ruled out by laboratory testing. We calculated relative risk (RR) for association between clinical findings and diagnosis of rabies. Statistical analyses were performed using Epi Info.

Results: Fourteen (58.3%) of 24 patients were diagnosed postmortem. Twelve (50%) patients had a definitive exposure history, with a median incubation period of 39 days (range, 21-240). The virus variant was identified in 23 cases, and 18 (78%) were associated with bats. Patients with rabies were more likely to display paresthesia (RR=4.9, 95% Confidence Interval [CI]=2.2-10.7), hydrophobia (RR=4.0, 95% CI=1.8-8.6), paresis (RR=4.0, 95% CI=1.8-8.8), or dysphagia (RR=3.0, 95% CI=1.5-6.3) and less likely to report headache (RR=0.29, 95% CI=0.13-0.63) than patients for whom rabies was ruled out.

Conclusions: A high proportion of U.S. rabies cases lack an exposure history. Rabies should be included in the differential diagnosis when paresthesia, hydrophobia, paresis, or dysphagia is noted in the clinical presentation. Early diagnosis is essential to minimize exposures and guide appropriate treatment decisions.

Keywords: rabies, viral encephalitis, epidemiology, surveillance

Poster 25
Controlling a Malaria Outbreak in a Tourist Resort Area in the Dominican Republic

Authors: M. James Eliades, D. Joa, J.M. Puello, C. Riera, P. Nguyen-Dinh

Background: Tourists traveling to areas where *Plasmodium falciparum* is transmitted are at risk for serious or fatal malaria. Annually 1 million tourists, mostly from North America and Europe, travel to Punta Cana (La Altagracia province) in the Dominican Republic (DR) where malaria is endemic. Resort areas had recently been considered risk-free, and chemoprophylaxis was not recommended. In November and December 2004, 17 cases of *Plasmodium falciparum* malaria in tourists were identified through global surveillance networks.

Methods: In response to this outbreak, the Ministry of Health (MOH) conducted active case detection for peripheral parasitemia in a random selection of the local population and conducted entomologic investigations of mosquito populations in La Altagracia province's 25 localities (pop: 129,926).

Results: The number of reported malaria cases in La Altagracia increased from 4-5/year in 2002-3 to 227 in 2004; 49% of these occurred in November and December, and all were *P. falciparum* infections. Of these 227 cases, 83% occurred in tourist areas, 86% were male, 84% were 20-49 years old, 52% were Haitian nationals, and 73% were construction workers. Of 160 potential breeding sites sampled, 44% contained *Anopheles* mosquito larvae. Malaria control measures implemented included enhanced case management, indoor residual insecticide spraying, and larviciding of *Anopheles* breeding sites. By May 2005, malaria incidence returned to baseline.

Conclusions: Increased incidence of malaria in non-immune visitors may signal increased transmission. Global surveillance networks and the prompt MOH response were key factors in terminating this outbreak. Surveillance and control measures may substantially reduce malaria around tourist areas and if extended to other parts of Hispaniola, might lead to eradication on the last Caribbean island with endemic malaria.

Keywords: malaria, outbreak, Dominican Republic, tourist resorts, Hispaniola

Poster 26
Disparities in Testing Practices for *Coccidioides* Among Patients with Community-Acquired Pneumonia — Metropolitan Phoenix, 2003–2004

Authors: Douglas C. Chang, B.J. Park, L. Burwell, K. Wannemuehler, S. Anderson, D. Engelthaler, S. Fridkin

Background: *Coccidioides spp*. may cause up to 29% of outpatient CAP, resulting in an estimated 30,000-90,000 cases annually in Arizona. Despite being a reportable disease, only 3660 cases were reported in 2004, possibly due to under-testing. To better understand testing practices, we studied patients presenting with CAP in two populations in Metropolitan Phoenix.

Methods: We conducted cohort studies in two large health systems (A and B) with clinics throughout Metropolitan Phoenix. A (17 clinics) mainly serves a privately insured population and B (13 clinics) serves large numbers without private insurance. We identified a random sample of visits with pneumonia ICD-9 codes during 2003 and 2004 for chart review. Patients were included if they initially presented as outpatients with clinician-diagnosed pneumonia, lacked a history of coccidioidomycosis, and were not institutionalized or recently hospitalized. Demographic, clinical, and diagnostic data, including *Coccidioides* testing, were extracted.

Results: Eighty-seven of 158 (A) and 66 of 132 (B) sampled visits coded for pneumonia were included. Symptoms, signs, and treatment were similar for patients in both systems. CAP patients in B had a greater median age (54 vs. 37) and were more likely to be diabetic (38% vs. 8%, $p<0.01$), two risk factors for developing severe disease. However, CAP patients in B were less likely to have *Coccidioides* serologic testing (2% vs. 13%, difference=11%, exact CI=3%-20%) and to receive chest radiographs (35% vs. 95%, $p<0.001$) than patients in A.

Conclusions: *Coccidioides* testing among patients with CAP is infrequent in both populations and significantly less frequent in the system serving large numbers of patients without private insurance. Opportunities for improved care exist; more research is needed to determine reasons for variations in testing.

Keywords: pneumonia, coccidioidomycosis, Valley Fever

Poster 27
Ascertainment of Risk for Polio Infection Among Iowa's Amish Community Members, 2005

Authors: Luca Flamigni, P. Quinlisk, J. Blair

Background: Since the 1840s, Amish communities have existed in Iowa. In 1979, after introduction from the Netherlands, a polio outbreak in North America resulted in three cases of paralytic polio in Iowa, all among unvaccinated Amish. In September 2005, the Minnesota Department of Health identified poliovirus type 1 in an unvaccinated, immunocompromised infant girl in an Amish community bordering Iowa. Because the Amish often have low vaccination coverage and travel frequently between communities, Iowa's Amish are at risk for spread of polio. We evaluated vaccination coverage in these communities by using immunization rates among Amish students.

Methods: We reviewed vaccination records in Iowa's Amish schools to establish immunization rates of Amish children aged 6–14 years. We used recorded religious exemption to vaccination as a proxy for lack of immunizations. All children with religious exemptions were considered susceptible to poliovirus. By using these vaccination rates, we extrapolated Amish immunization rates.

Results: Of 99 Iowa counties, 20 have at least one Amish community, including 28 Amish schools. By using Religious Congregation and Membership from the 2000 U.S. census data, the total Amish population was estimated at 2,939. In Iowa schools, 547 Amish children aged 6–14 years were enrolled, and 276 (50.5%) children had religious exemptions for immunizations.

Conclusions: Vaccination coverage in Iowa's Amish communities is estimated to be 50%. Because immunization rates of ≥85% are needed to provide herd immunity to polio, these communities might allow the spread of poliovirus if introduced. Public health interventions are ongoing to educate the community on the importance of immunizations and to provide culturally appropriate vaccination clinics.

Keywords: Amish, immunization rates, Iowa

Poster 28
Outbreak of Pertussis in an Amish Community — Kent County, Delaware, October 2004–February 2005

Authors: Kathy Kudish, A. Cohn, K. Kretsinger, C. Mijalski, P. Eggers, E. Outten, P. Cassiday, P. Nuorti

Background: Despite routine childhood vaccination with diphtheria-tetanus-pertussis (DTP/DTaP), outbreaks of pertussis continue to occur among underimmunized groups. During October 2004–February 2005, a pertussis outbreak occurred in an Amish community in Delaware. We determined the extent of the outbreak, investigated transmission patterns, and identified barriers to vaccination.

Methods: Persons living in the Amish community with cough for ≥2 weeks were ascertained through active surveillance and a self-administered survey. Cases were classified as confirmed, probable, and suspected according to the Council of State and Territorial Epidemiologists and CDC case definitions. Nasopharyngeal swabs were tested for pertussis by polymerase chain reaction (PCR) at the Delaware Public Health Laboratory. We interviewed case-household members by using a standardized questionnaire and obtained DTP/DTaP vaccination status from the Delaware Immunization Registry.

Results: A total of 274 cases (48 confirmed, 105 probable, and 121 suspected) occurred in 96 (30%) of 323 Amish households. Of nasopharyngeal swabs obtained from 49 patients, 30 (61%) tested positive for pertussis by PCR. Of 153 confirmed and probable cases, eight patients (5%) were aged 0–11 months; 75 (49%) were aged 1–5 years; 51 (34%) were aged 6–14 years; and 19 (13%) were aged >15 years. Among children aged 6 months–10 years residing in case-households, only 34% had >3 doses of DTP/DTaP documented. Among 48 (50%) of 96 households that reported not vaccinating family members, 21 (44%) reported fear of side effects as the reason.

Conclusions: An outbreak of pertussis occurred among members of an undervaccinated community; the most cases were observed in children aged 1–5 years. Culturally appropriate educational messages might improve vaccine coverage and prevent future outbreaks among young children.

Keywords: Amish, pertussis, *Bordetella pertussis*, attack rate, nasopharyngeal, polymerase chain reaction

Poster 29
Risk Factors for *Helicobacter pylori* in a Rural Community — Montana, 2005

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

Background: *Helicobacter pylori* infection can cause duodenal ulcers, gastritis, and gastric adenocarcinoma. Previous studies have reported that household crowding, lower socioeconomic status, and contaminated water might be risk factors for infection. In response to local concerns in a rural Montana community, we investigated to determine prevalence of active *H. pylori* infection and to identify possible risk factors.

Methods: In a cross-sectional survey, we randomly sampled 237 households from 1,580 geo-coded locations in the community's emergency medical system database. Survey teams used geographic positioning system units to navigate to each house, randomly selected one eligible household member according to set criteria, and upon consent, administered a questionnaire and a C13 Urea Breath Test (UBT) to diagnose active *H. pylori* infection.

Results: Among 107 persons reached to date, 98 were eligible, and 80 (82%) have been interviewed and tested. Infection prevalence was 50% and increased significantly with age (p=.04), from 30% among persons aged 0–19 years to 65% among persons aged ≥60 years. Respondents were twice as likely to have a positive UBT if their father's highest education level was eighth grade or less (prevalence ratio [PR]: 2.1; 95% confidence interval [CI]=1.3–3.3). Preliminary analysis indicates that municipal water might be associated with a positive UBT (PR: 1.4; 95% CI=0.9–2.3). Infection was not associated with gastrointestinal complaints or current or childhood household crowding.

Conclusions: Active *H. pylori* infection is highly prevalent and increases with age in this community. Lower socioeconomic status appears to be associated with infection, consistent with previous studies. Further environmental and epidemiologic studies are needed to assess the potential role of municipal water as a risk factor in this community.

Keywords: *Helicobacter pylori*, UBT, urea breath test, rural community

Poster 30
Imported Measles in a New Hampshire Resident — 2005

Authors: Rachel N. Plotinsky, E.A. Talbot, J. Noble, K. Salome, S. MacRae, S. Saviteer, B. Anderson, J.T. Montero

Background: Measles has declined in the United States since the introduction of vaccine, but it can be imported from endemic areas. Persons considered immune on the basis of clinical history of measles might be susceptible to measles. A New Hampshire man aged 52 years, whose mother reported he had had measles as a child, contracted measles after travelling overseas. We investigated to confirm the diagnosis and evaluate contacts.

Methods: The patient's serum was tested at New Hampshire's public health laboratory. Community and health-care contacts were defined as those in the same room as the patient during his infectious period. We performed serologic testing for health-care-worker (HCW) contacts who did not have documented receipt of two measles-containing vaccines or prior serologic evidence of immunity.

Results: The patient's symptoms, including headache, fever, nausea, vomiting, and cough, began 10 days after returning from Belgium. Rash appeared 4 days later. Serum drawn 10 days after illness onset was positive for measles IgM. Of 22 HCWs identified who had no prior evidence of measles immunity, eight, all born after 1956, were susceptible to measles by IgG testing. These eight were excluded from patient care until 21 days after exposure; one was pregnant and received immune globulin. Vaccination would not have prevented disease among these contacts because they were identified >72 hours after exposure.

Conclusions: Clinicians should maintain a high index of suspicion for measles among patients traditionally considered immune by a history of physician-diagnosed measles if they have compatible rash illness and history of travel to settings where measles circulates. Ensuring documented immunity among HCWs would have eliminated the need to exclude exposed HCWs from patient care.

Keywords: measles, health care, New Hampshire, vaccination

Poster 31
Changing Prevalence of Intestinal Parasites Among Newly Arrived Southeast Asian and African Refugees After Empiric Predeparture Albendazole Treatment — Minnesota, 1993–2004

Authors: Stephen Swanson, B. Lee, B. Mamo, K. Smith, W. Stauffer

Background: Intestinal helminths infect at least 25% of the world's population and are a leading cause of morbidity among vulnerable populations. In May 1999, the Centers for Disease Control and Prevention implemented a refugee treatment protocol for intestinal parasites. All refugees aged >2 years, excluding pregnant women, receive a single oral 600-mg dose of albendazole before departure to the United States.

Methods: To evaluate the impact of this pre-departure albendazole treatment protocol, we analyzed the prevalence of stool helminths and *Giardia intestinalis* among 11,856 African and 6,159 Southeast Asian refugees who were screened upon arrival in Minnesota during 1993–2004. Children aged <2 years were excluded from analysis of albendazole treatment effect.

Results: Among refugees who arrived before May 1999 (untreated with albendazole), 21.5% had at least one stool helminth and 3% had multiple helminths; hookworm was the most common helminth (8.7%). Among refugees who arrived after May 1999 (albendazole-treated), 8.4% had a stool helminth and 0.6% had multiple helminths; *Trichuris* was the most common helminth (4.7%). Refugees who received predeparture albendazole were less likely to have any intestinal nematode (odds ratio [OR]=0.25; 95% confidence interval [CI]=0.22–0.27), *Ascaris* (OR=0.09; 95% CI=0.06–0.12), hookworm (OR=0.06; 95% CI=0.05–0.08), *Trichuris* (OR=0.52; 95% CI=0.46–0.60), or *Strongyloides* (OR=0.21; 95% CI=0.16–0.29). *Strongyloides* was most prevalent among Southeast Asian refugees (121/174 cases). Overall, *Giardia* was the most common intestinal pathogen detected among treated (8.3%) and untreated (10.7%) refugees.

Conclusions: Empiric albendazole treatment of pre-departure refugees has contributed to a significant decrease in intestinal parasitoses. The prevalence of certain intestinal parasites remains substantial among arriving refugees, indicating potential benefit of an expanded predeparture treatment protocol over single-dose albendazole treatment.

Keywords: refugees, helminths, *Giardia*, parasites, albendazole

Wednesday, April 26, 2006

Session J: It's Not Just a Cold: Influenza
Grand Ballroom
1:30 p.m.–3:15 p.m.
Moderator: Ray Strikas

Persistent Circulation of Highly Pathogenic Influenza — Hawaii, 1918–1920
1:35 p.m.

Authors: Kate Gaynor, H. He, S. Park, P. Effler

Background: Preparedness for pandemic influenza has become a top public health priority. Lessons can be learned from the devastating 1918 influenza pandemic, which killed ~700,000 persons in the United States alone. We analyzed epidemiologic data from Hawaii to characterize the impact of the 1918 pandemic on this geographically isolated territory.

Methods: From the Hawaii vital statistics database, we collected 38,000 death certificate records dated 1914–1922. Influenza mortality estimates included deaths attributed to pneumonia, influenza, bronchitis, or "grippe." Deaths were stratified by 10-year age increments, and racial data were reclassified into federal census categories. Baseline influenza mortality was determined for the nonpandemic period 1914–1917.

Results: The influenza fatality rate increased 1.9 times over baseline during October 1918–April 1919 (from 154 to 299 deaths/100,000 persons) and 3.4 times over baseline during October 1919–April 1920 (to 523 deaths/100,000 persons). The fatality rate peaked in March 1920, at 11 times the March baseline. Excess influenza mortality during 1918–1920 was greatest among persons aged 31–40 years (11.0 times baseline) and lowest among the extreme age groups (1.2 times greater among persons aged <10 and 2.0 times greater among persons aged >60 years). The largest influenza mortality increases by racial group occurred in the Chinese and Other Asian categories (44% and 56% greater, respectively, than the increase among whites).

Conclusions: Although pandemic influenza arrived in Hawaii in 1918, pandemic-associated mortality did not peak until March 1920. Asian racial groups were disproportionately affected. The persistent circulation of highly pathogenic influenza a year later than conventionally recognized and the possible increased risks for certain ethnic groups during a pandemic should be considered in pandemic response planning.

Keywords: influenza, pandemic, Hawaii, mortality

Screening and Isolation of Suspected Highly Communicable Diseases in Emergency Departments — New York City, 2005
1:55 p.m.

Authors: Benjamin W. Tsoi, Y. Jean-Francois, L. DiBiase, L. Soloff, D. Berg, E. Lee

Background: Infectious disease threats (e.g., pandemic influenza) have highlighted the hospital's need to have systems in place to rapidly recognize and isolate potential cases to minimize nosocomial transmission. The New York City Department of Health and Mental Hygiene (NYCDOHMH) worked with NYC hospitals to develop, implement, and evaluate screening and isolation protocols for potentially infectious patients presenting to emergency departments (EDs).

Methods: All NYC hospitals were asked to train a minimum of 90% of ED triage staff and 60% of all ED staff on a DOHMH-approved protocol. Each hospital then underwent an unannounced evaluation in which a single patient presenting with either 1) fever, respiratory symptoms, and recent travel history; or 2) fever and rash. DOHMH evaluators assessed the presence of patient signage on ED arrival, use of masks and hand-hygiene products, and time to appropriate patient isolation.

Results: To date, 43/58 (74%) NYC hospitals have completed an evaluation. Of these, 83% had entrance signs instructing symptomatic patients to report to triage and don masks. Mean time from patient arrival to triage was 8 minutes; 58% of patients were offered masks upon presentation; and 80% of patients were placed in an isolation room after triage. Overall, 65% of health-care workers (HCWs) wore appropriate personal protective equipment (PPE); 50% donned and doffed PPE properly; and 65% performed hand hygiene after patient evaluation.

Conclusions: Although certain hospitals used appropriate patient-screening and isolation procedures, HCWs often did not wear nor use PPE correctly and often did not perform proper hand hygiene, emphasizing the need for continued HCW education regarding both topics. These single-patient evaluations provide an effective method for assessing hospital performance on communicable disease triage and isolation.

Keywords: communicable diseases, preparedness, infection control, hospital emergency services, New York City

Influenza Vaccine Effectiveness Against Laboratory-Confirmed Influenza Among Children Aged 6–59 Months — Georgia, 2003–2004
2:15 p.m.

Authors: Carrie Shuler, M. Iwamoto, R. Neeman, M. Marin, S. Bloom, P. Gargiullo, C. Bridges, T. Yoder, H. Keyserling, P. Terebuh

Background: Influenza is a leading cause of illness among children. Studies have rarely measured influenza vaccine effectiveness (VE) among young children, particularly when antigenic match between vaccine and circulating viruses is suboptimal. We assessed VE against medically attended, laboratory-confirmed influenza for children aged 6–59 months during the drifted 2003–04 influenza season.

Methods: In a case-control study conducted in a single pediatric practice, case-patients aged 6–59 months with laboratory-confirmed influenza were age-matched 1:2 to eligible control subjects. Vaccination status was ascertained on the date of the case-patient symptom onset. Conditional logistic regression was used to calculate VE, adjusting for underlying medical conditions and health-care usage.

Results: We identified 290 influenza case-patients for November 1, 2003–January 31, 2004. Eighty-seven (30%) case-patients and 235 (41%) controls were fully vaccinated (second dose of vaccine since September 2003 with ≥14 days before case-patient illness onset and >1 month after first dose); 66 (23%) case-patients and 99 (17%) controls were partially vaccinated (second dose of vaccine <14 days before case-patient illness onset or received only 1 dose since September 2003, with no previous dose of vaccine); and 138 (47%) case-patients and 246 (42%) controls were unvaccinated. VE among fully vaccinated children, compared with unvaccinated children, was 45% (95% confidence interval [CI]=20–60). Partially vaccinated children had no significant reduction in influenza compared with unvaccinated children (adjusted odds ratio [AOR]: 1.1; 95% CI=0.8–1.7).

Conclusions: Full vaccination provided limited protection against laboratory-confirmed influenza among children aged 6–59 months during a season with suboptimal vaccine match. No VE was identified with partial vaccination, affirming that children need to be fully vaccinated to obtain protective effects.

Keywords: influenza, children, vaccine effectiveness

Survey of State Practices During the Influenza Vaccine Shortage of 2004–2005
2:35 p.m.

Authors: Tom T. Shimabukuro, P. Wortley, B. Bardenheier, E. Bresnitz, M. Cartter, A. DeBlois, C. Hahn, C. Hannan, E. Mangione

Background: During the 2004-05 influenza season vaccine shortage, states expended unprecedented effort managing vaccine procurement, allocation, and prioritization. To understand these efforts, we described state-level actions and determined the relationship between vaccine supply and coverage.

Methods: From late March through April 2005, we conducted a web-based survey of state health departments, including the District of Columbia (DC). The focus was vaccine prioritization; executive and legislative action; needs assessment; emergency preparedness; and redistribution and reallocation. We conducted linear regression to examine coverage changes, by state, in relation to vaccine supply, defined as estimated doses distributed per 100 priority adults.

Results: All states and DC responded. 49 (96%) respondents adopted or recommended adherence to the initial Advisory Committee on Immunization Practices interim recommendations. 12 (24%) further recommended long-term care residents receive priority over staff. In 18 (35%), the state health officer or governor issued an emergency or executive order, or the legislature passed a law or statute related to prioritization. 41 (80%) initiated emergency preparedness activities and 22 (43%) referred to or implemented components of their pandemic influenza plans. In 39 (76%), state or local health departments participated in redistributing private sector vaccine. States with >75 doses of vaccine/100 priority adults in early October 2004 had significantly lower decreases in coverage for adults >65 years old from the previous year, compared to those with <50 doses/100 priority adults (p=0.01).

Conclusions: States overwhelmingly followed national vaccine prioritization guidelines and used a range of activities to manage shortage issues. Higher vaccine supply was associated with lower decreases in coverage. Furthermore, initiating emergency preparedness activities and using pandemic influenza plans may be valuable experience for future public health crisis management.

Keywords: influenza, vaccination, prioritization, survey, pandemic influenza

Correlates of Not Receiving Influenza Vaccination Among Health-Care Personnel — United States, 2004–2005
2:55 p.m.

Authors: Suchita A. Lorick, P.M. Wortley, M. Lindley, B. Bardenheier, G.L. Euler

Background: Healthcare personnel, especially those with direct patient contact, can transmit influenza to patients. Since 1984, the Advisory Committee on Immunization Practices has recommended that healthcare personnel receive annual influenza vaccination; however, national coverage was only 40% in 2003. National-level data about healthcare personnel are limited.

Methods: Data from the January and February 2005 Behavioral Risk Factor Surveillance System, a cross-sectional, ongoing, state-based telephone survey of civilian, noninstitutionalized persons ≥ 18 years of age, were analyzed using SUDAAN 9.0. Multivariable analyses were performed to identify factors associated with non-receipt of influenza vaccination during the 2004-05 season.

Results: Of 60,387 respondents, 5,039 reported working in a healthcare facility (HCF). Among HCF workers, 37% (2,051) reported being vaccinated compared to 20% (13,822) among non–HCF workers (X2: p<0.001). HCF workers reported two main reasons for non-receipt of influenza vaccination: believing they did not need the vaccine (37%) and the vaccine shortage (32%). In the multivariable analysis, factors significantly associated with non-receipt of influenza vaccine among HCF workers were: age 18-49 and 50-64 years compared to ≥65 [Adjusted odds ratio(AOR)= 12.17 95% CI=6.85-21.63 and AOR= 6.36 95% CI=3.63-11.16 respectively], ≤ high school graduate compared to college graduate (AOR= 1.75 95% CI=1.20-2.53), not having direct patient contact (AOR=2.00 95% CI=1.35-2.97), and reporting cost as a barrier to medical access (AOR=1.66 95% CI=1.06-2.62). Sex, race/ethnicity, marital status, income, children living in the household, self-reported health status, medical indication for influenza vaccination, healthcare coverage, and having a healthcare provider were not significantly associated.

Conclusions: Healthcare personnel need to be convinced that receiving an influenza vaccination can help protect them and their patients. Reliable vaccine supplies and cost barriers should be addressed.

Keywords: health personnel, influenza, vaccination, behavioral risk factor surveillance system

Mass Distribution of Intranasal Influenza Vaccine in a Public School System — Tennessee, 2005
3:15 p.m.

Authors: Lawrence R. Carpenter, S. Hall, J. Lott, T. Jones, W. Schaffner

Background: Influenza affects up to 20% of the U.S. population and is responsible for 36,000 deaths annually. School-aged children are thought to be a source of infection for persons at high risk for influenza-related complications. During October–November 2005, intranasal live-attenuated influenza vaccine was offered free to all students in grades K–12 in a Tennessee metropolitan school system. We assessed the success of this campaign and barriers to implementation.

Methods: We collected data on the school population, vaccination rates, and staff time expended during this campaign. Interviews were conducted with health department and school staff regarding vaccination participation and barriers.

Results: Overall, 21,281(39%) of 53,987 students were vaccinated. Rates varied from 70% at one school to 10% at another. High school students were significantly less likely to be vaccinated than elementary and middle school students (risk ratio=1.28; 95% confidence interval=1.26–1.30). During planning and implementation, health department and school staff expended >7,500 person-hours (90 person-hours/school). Implementation of the campaign necessitated curtailing selected health department functions. Misperceptions among physicians regarding attenuated live-virus vaccine resulted in concern among parents, especially parents with chronic medical conditions, and among pregnant teachers. Because of these concerns, certain children did not participate, and school system leaders granted administrative leave to pregnant teachers.

Conclusions: We document the first evaluation of an intranasal influenza vaccination campaign in a metropolitan school system. Many students participated in this school-based campaign; however, implementation required substantial health department and school resources. Misperceptions about the vaccine contributed to decreased acceptance. Improved targeted communication among physicians and parents, especially the parents of high school students, regarding vaccination risks and benefits may improve future vaccination rates.

Keywords: influenza, influenza vaccines, mass immunization, vaccination

Wednesday, April 26, 2006
Session L: Field Epidemiology: Putting Science into Practice Around the World: International Night
Habersham Room
7:30 p.m.–9:35 p.m.

Moderators: Jeffrey P. Koplan and Roberto Antonio Flores Reuna

Paralytic Shellfish Poisoning Outbreak, — Corinto, Nicaragua, November 2005
7:35 p.m.

Authors: Ana C. Meléndez Darce, L. Callejas, C.L. Conklin, C. Alonso

Background: On November 5, 2005, the health unit of the municipality of Corinto reported 5 patients with neurological symptoms after eating seafood. An investigation was initiated to characterize the outbreak and develop preventive measures.

Methods: A case control study was conducted. A case was defined as a person from Corinto that developed one or more neurological symptoms after eating seafood, with symptoms onset during November 4–16. Three controls for each case were selected from family members or neighbors of the cases. Personal interviews were conducted among cases and controls using a standard questionnaire. Information relating to socio-demographic variables, food exposures, and symptoms was collected. Finfish and mollusk samples from the outbreak area were collected for laboratory testing.

Results: Of 20 cases identified, 10 (50%) were males; median age of cases was 22 years (range: 5-87 years). The most frequently reported symptoms were diarrhea--20 (100%), paresthesia on arms--18 (90%), peri-oral paresthesia--16 (80%), paresthesia on legs--13(65%), vomiting--13(65%), and sensation of floating--9 (45%). The incubation period was 3 hours (range: 30 minutes-10 hours). Eating black shell clams (*Polymesoda inflata*), was reported by 18/20 (90%) cases and 35/64 (55%) of controls, (OR= 7.5 [IC95%: 1.6-35]). A mouse bioassay from mollusks specimens implicated saxitoxin, the toxin responsible for paralytic shellfish poisoning.

Conclusions: This is the first investigation of paralytic shellfish poisoning in Nicaragua. As a result of this investigation, the ministry of health issued a ban on the harvesting and sale of black shell clams on November 11, 2005, and increased surveillance for this disease along the Pacific Coast.

Keywords: paralytic shellfish poisoning, black shell, Nicaragua

Coliform Outbreak in a Southeastern Island in Luzon — Philippines, 2005
7:55 p.m.

Authors: Rosario P. Pamintuan, B. Vingno, J. Navarro, M. Niñal, E. Tayag

Background: On December 9, 2005, an FETP team was sent to investigate the cause of increasing diarrhea cases in a southeastern island province of Luzon. A cholera outbreak was investigated in the same municipality on October 2005.

Methods: Review of cases in the hospitals was done. An unmatched case-control study was done in the village with the highest attack rate. Cases were recently well individuals who had watery stools, three or more times per day anytime from November 1 to December 16, 2005. Controls were residents in the nearest unaffected households. Rectal swabs were taken from cases and controls. Drinking water samples were taken for bacteriologic analysis. Key informant interview and environmental survey were conducted.

Results: There were 55 cases and 110 controls. Cases were more likely to have drunk water from the piped-in municipal water system (OR 2.38; 95%CI: 1.01 - 5.71, ρ = 0.02). Cases were less likely to have boiled, filtered or purified their drinking water (OR 0.20092; 95%CI: 0.08-0.46; ρ = 0.00003). Four percent of the rectal swabs were positive for *Aeromonas caviae*, 4% for *E.coli,* 4% for *Salmonella* and 2% for *Vibrio spp*. Seventeen percent of the drinking water samples were positive for fecal coliforms. Six confined patients were positive for *E. coli*. Majority get their drinking water from the municipal water system with 50-year old pipelines, and leaking couplings that were risks for contamination.

Conclusions: The diarrhea outbreak in a southeastern island in Luzon, probably due to contamination, is associated with the piped-in municipal water system. Authorities had the pipes replaced; water distribution system flushed; maintained regular chlorination; and monitored residual chlorine. Massive information and education campaign was conducted.

Keywords: diarrhea, outbreak, cholera, coliform

High-Level Beta-Hexachlorocyclohexane Contamination in Dairy Farms — Sacco River Valley, Latium, Italy, 2005
8:15 p.m.

Authors: Marcello Sala, M. Miceli, P. Rombolà, F. Scolamacchia, A.Ubaldi, A. Battisti

Background: In March 2005, the Italian National Monitoring System on Chemical Residuals in Food of Animal Origin detected levels of the pesticide beta-hexachlorocyclohexane (ß-HCH) in bulk-milk from a dairy farm in the Sacco River valley that were 30 times higher than the legal limit of 3ppb. B-HCH, a lindane isomer and possible human carcinogen, was subsequently found in milk from several neighboring farms. A study was therefore undertaken to evaluate the extent and risk factors for contamination.

Methods: All dairy cattle farms in the valley were enrolled in a retrospective cohort study and their bulk milk analyzed for ß-HCH. A questionnaire was administered to farmers to evaluate possible exposure factors. Low-level contamination was defined as ß-HCH levels in bulk-milk between 0-1.9ppb and high-level as ≥2ppb.

Results: Of 244 farms tested, 34 (13.9%) had high-level contamination. Feeding animals on fodder cultivated in soils watered with and/or flooded by river water was observed in 33/34 (97.0%) of high-level farms and in 23/210 (10.9%) of those with low contamination (relative risk =110.8; 95% confidence interval 15.5-792); the risk remained essentially unaltered after controlling for several potentially confounding variables. Subsequent investigation by local environmental authorities revealed that the source of contamination was an abandoned industrial site near the riverbank that had produced lindane for decades; high ß-HCH levels were demonstrated in water sediments, soil, and fodder from the area.

Conclusions: Cattle fodder cultivated near a contaminated river was the main risk factor for ß-HCH-contaminated milk. On the basis of the epidemiologic evidence and environmental testing, watering local fields with river water and production of fodder in farms with contaminated soil was banned, and all animals from positive farms were culled.

Keywords: beta-hexachlorocyclohexane, organochlorines, milk, cattle, cohort study

Outbreak of Cholera in a refugee camp in Kenya — May 2005
8:35 p.m.

Authors: Jared.O. Omolo, A. Shultz, M. Weinberg, D. Koros, C. Njuguna, J. Njoroge, D.M. Qassim, D. Feikin, R.F. Breiman, H. Burke

Background: In May 2005, an outbreak of acute watery diarrhea was reported in Kakuma refugee camp, Kenya. We conducted an investigation to define the magnitude of the outbreak and to identify preventable risk factors.

Methods: A suspect case of cholera was defined as a patient ≥ 2 years old with >3 watery stools per day. Demographic, clinical and exposure history was gathered through case interviews and hospital records review using standardized questionnaires. Stool specimens were collected when possible from case patients for bacterial culturing. Ninety suspect cases were randomly selected along with 170 asymptomatic controls for a case control study. Controls had experienced no acute diarrhea within six months and were matched to case patients by age-group and neighborhood.

Results: There were 522 suspect cases and 14 deaths (case fatality rate=2.6%) between 1st April 2005 and 30th June 2005 with a peak in mid-May; mean age was 19 years (range = 2-75 years). Attack rate was 39 per 10,000 persons. *Vibrio cholerae* (Inaba serotype) was isolated from 46 (41.8%) stool specimens from approximately 110 suspect cases. Suspect cases of cholera were more likely than controls to have recently arrived in camp [Matched Odds Ratio (M.O.R) =5.32; 95% Confidence Interval (C.I) =1.54-18.43] and to have >3 households sharing a toilet (MOR=2.3; 95%CI=1.05-5.05). Protective factors included keeping stored water sealed (MOR=0.48; 95% CI=0.24-0.96) and washing hands with soap (MOR=0.59; 95%CI=0.35-0.99).

Conclusions: Breakdowns in hygiene and sanitation were likely responsible for the outbreak. Control measures included education campaigns on cholera prevention with emphasis on hygiene and sanitation. Surveillance for cholera was enhanced especially among new refugee arrivals. No cholera cases were reported after mid- July 2005.

Keywords: Cholera, outbreak, refugee

Paratyphoid Fever in the United States: An Underestimated Disease
8:55 p.m.

Authors: Sundeep K. Gupta, M. Omondi, J. Whichard, F. Medalla, T. Chiller, E. Mintz

Background: Since 1968, paratyphoid fever (infection with *Salmonella paratyphi* A, B or C) in the United States has increased five-fold, but its epidemiology has not been described. Antimicrobial resistant paratyphoid fever has recently increased in Asia, causing concerns regarding treatment failure. Like typhoid fever, paratyphoid fever is life-threatening and endemic in countries with poor water infrastructure. However, no vaccine is available to protect travelers from paratyphoid fever.

Methods: For one year beginning April 1, 2005, all 50 state health departments agreed to administer a standard patient questionnaire and send *Salmonella Paratyphi* A isolates to CDC for susceptibility testing.

Results: Through October 31, 93 S. Paratyphi A cases were reported. Of 57 patients interviewed, median age was 27 years (range, 1–67); 54% were male. Most (91%) isolates were from blood. Fifty-six (98%) patients reported fever and 25 (46%) had diarrhea; 35 (61%) were hospitalized. No deaths or outbreaks were reported. Fifty-five (96%) patients traveled internationally ≤ 30 days before illness onset. Of these, 49 (89%) traveled to South Asia. Of 59 isolates tested, forty-four (76%) showed decreased susceptibility to ciprofloxacin (minimum inhibitory concentration ≥ 0.12μg/ml), the first line antimicrobial. Of 31 cases with both interview and laboratory results, 22 (96%) of 23 isolates with decreased susceptibility to ciprofloxacin were from travelers to South Asia, compared to 3 (38%) of 8 susceptible isolates (p=.01).

Conclusions: In the United States, paratyphoid fever and decreased susceptibility to ciprofloxacin are associated with travel to South Asia. Clinicians should consider paratyphoid fever when evaluating patients with typhoidal syndrome, and counsel travelers to avoid unsafe food and water. Heightened efforts to develop a vaccine and to explore alternative antimicrobials are needed.

Keywords: Paratyphoid fever, antimicrobial drug resistance, travel

A Prison-Based Foodborne Outbreak of Gastroenteritis Involving Several Pathogens — Spain, 2005
9:15 p.m.

Authors: Victoria Hernando, N. Arranz, L. Puell, I. Martín, S. Catalán, P. Gómez, C. Hidalgo, D. Herrera

Background: On September 25, 2004, approximately one-hundred inmates experienced the sudden onset of diarrhoea and abdominal pain. It is the largest foodborne outbreak described in a prison population in Spain. Day before onset a special meal was served. Our objective was to confirm the outbreak, to identify risk factors and the causative agent, and to implement control measures to prevent futures similar outbreaks.

Methods: We conducted a cohort analysis over a stratified random sample out of all inmates. Those hospitalised or isolated were excluded because of difficulties in interviewing. The environmental investigation included an evaluation of the kitchen and the cantine and cultures of meals and stool samples of several cases.

Results: Almost 10% of 1,800 inmates were ill. Overall 196 inmates were interviewed, 28% experienced symptoms of gastroenteritis. The main symptoms were abdominal pain (85%) and diarrhea (71%). The median incubation period was 7 hours (range:1–22h). All consumed foods caused similar attack rates. Eating all of the seafood cocktail at lunch or all of the fried shrimp at the dinner on September 24 was associated with risk of illness (RR=2.0, 95%CI=1.1-3.8 and RR=1.8, 95%CI=1.1-3.1). Working in the prison was associated with higher risk of illness (RR= 1.8 95%CI=1.1-3.0). *Clostridium perfringens*, *Bacillus cereus* and E. *Coli* were isolated from one sample of seafood cocktail served on September 24. Inappropriate storage was reported in the food prepared on September 23 and served on September 24.

Conclusions: A gastroenteritis outbreak caused by several pathogens was confirmed. Both reported symptoms and calculated incubation periods correspond to the pathogens isolated. Preparation of food prison facilities should meet minimum safety standards, including refrigeration facilities and training of food handlers.

Keywords: *C. perfringens*, *B.cereus*, prison, gastroenteritis

Thursday, April 27, 2006
Session M: Eureka! I've Found It.: Mackel Award Finalists
Grand Ballroom
8:30 a.m.–10:15 a.m.
Moderator: Rima F. Khabbaz and Michael McGeehin

Ralstonia Contamination of Neonatal Oxygen Delivery Device — United States, 2005
8:35 a.m.

Authors: Michael A. Jhung, R. Sunenshine, J. Noble-Wang, F. Lewis, B. Jensen, D. Jernigan, M. Arduino, A. Srinivasan

Background: In August, 2005, Hospital A notified CDC of a possible *Ralstonia* outbreak among patients receiving supplemental oxygen therapy. *Ralstonia* are waterborne bacilli that have been previously implicated in hospital-acquired infections. The Vapotherm™ 2000i delivers humidified oxygen via nasal cannula and has become popular among neonatologists. Approximately 4,500 Vapotherm devices are employed in 900 hospitals in the United States.

Methods: We performed a case-control study at Hospital A and conducted national case-finding to obtain clinical and environmental samples for laboratory analysis. Case-patients had healthcare-acquired *Ralstonia*; controls were matched for hospital exposure time. Isolates were compared using pulsed-field gel electrophoresis (PFGE).

Results: Five patients at Hospital A met the case definition. Patients exposed to Vapotherm were more likely to develop *Ralstonia* colonization than patients not exposed (OR=17.8, 95% CI=2.22-141.8). Case-finding revealed Ralstonia in 40 patients from 29 hospitals in 18 states. All were less than 18 years old; 39 had exposure to Vapotherm. Hospitals recovered *Ralstonia* from clinical specimens, machines in-use and machines cleaned per manufacturer's recommendations. To date, PFGE shows genetically indistinguishable *Ralstonia* strains from 12 hospitals in six states. A contaminated Vapotherm machine, subjected to higher-level disinfection suggested by the manufacturer due to initial findings, showed no growth immediately following cleaning; after 7 days of simulated use, the machine again grew *Ralstonia*. Unused Vapotherm cartridges grew *Ralstonia* at two hospitals. On December 20, 2005, the Food and Drug Administration advised against using Vapotherm, pending resolution of this investigation.

Conclusions: Vapotherm machines can be colonized with *Ralstonia*. A common strain of *Ralstonia* suggests intrinsic contamination of the device. Clinicians should consider alternative oxygen delivery devices for patients who require humidified oxygen therapy.

Keywords: *Ralstonia*, oxygen inhalation therapy, infant, equipment contamination, infection control

Multistate Outbreak of *Escherichia coli* O157:H7 Infections Associated with Prepackaged Lettuce Salad Advertised as "Ready-To-Eat," 2005
8:55 a.m.

Authors: Stephen J. Swanson, S. Jawahir, C. Braymen, C. Braden, M. Joyner, K. Smith

Background: *Escherichia coli* O157:H7 (O157) is an important cause of hemorrhagic colitis and hemolytic uremic syndrome (HUS). In September 2005, the Minnesota Department of Health detected a cluster of O157 case-isolates with an indistinguishable pulsed-field gel electrophoresis (PFGE) pattern, suggesting a common source.

Methods: To determine the outbreak vehicle, we conducted a case-control study of 10 Minnesota case-patients and 25 controls, matched by age and telephone-exchange. Cases were defined as culture-confirmed O157 infections with isolates demonstrating the outbreak PFGE pattern and illness onset after September 7, 2005. Cases in other states were identified through the National Molecular Subtyping Network for Foodborne Disease Surveillance. The Minnesota Department of Agriculture used novel extraction/isolation techniques to culture left-over prepackaged salad associated with case-patients.

Results: We identified 26 cases in three states (Minnesota-23; Wisconsin-2; Oregon-1). The median age of case-patients was 39.5 years (range: 3-84 years); 12 (46%) were hospitalized, and two developed HUS. Illness onsets ranged from September 14–30, 2005. Consumption of prepackaged Brand A salad during the week preceding illness onset was associated with O157 infection (matched odds ratio=10.1, 95% confidence interval=1.5–67.3). Implicated prepackaged salad varieties all contained romaine lettuce, and having undergone a superchlorinated wash, were advertised as "triple washed and ready-to-eat." Salad from case-households had identical production codes, indicating a common processing plant and production date. The outbreak strain of O157 was isolated from two bags of Brand A salad associated with three case-patients.

Conclusions: The outbreak vehicle, prepackaged Brand A salad, was promptly recalled. Rapid epidemiologic response and novel laboratory methods enabled isolation of the outbreak strain of *E. coli* O157:H7 from lettuce for the first time during a public health investigation.

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

Lymphocytic Choriomeningitis Among Organ Transplant Recipients from a Pet Hamster — Massachusetts/ Rhode Island, 2005
9:15 a.m.

Authors: Boris I. Pavlin, M. Kuehnert, A. Likos, B. Amman, J. Comer , C. Rowland, P. Rollin, S. Zaki, S. Nichol, T. Ksiazek, the LCMV in Transplant Recipients Investigation Team

Background: Lymphocytic choriomeningitis virus (LCMV) is carried by the house mouse (*Mus musculus*) and, less commonly, other rodents. In immunocompromised persons, LCMV infection can be fatal. In 2005, four transplant recipients developed severe illness; three died. LCMV was identified in all four. An investigation was done to identify the mode of transmission, including a possible pet animal reservoir, and to educate the public about LCMV risk reduction.

Methods: Field investigation involved chart reviews; interviews with hospital staff and the donor's family and co-workers; evaluation of transplantation procedures; donor homesite assessment; rodent trapping; and commercial rodent distribution traceback. Laboratory investigation included serology, immunohistochemistry, reverse transcriptase–polymerase chain reaction, and virus isolation from donor, recipient and rodent tissues.

Results: We identified an identical strain of LCMV in all four transplant recipients. LCMV was not detected in donor samples, but a pet hamster in her home yielded an LCMV isolate identical to the recipients', confirming the source of LCMV transmission by organ transplantation. Traceback revealed two more hamsters and a guinea pig (3.4% of 56 rodents) from the retailer of the pet hamster to be positive for LCMV. All rodents came from a single distributor, where testing revealed LCMV infection in four (3.4%) of 115 hamsters. Infection-control measures, including culling of rodents and decontamination of facilities, were implemented.

Conclusions: Laboratory and epidemiologic evidence demonstrated transmission of LCMV from a pet hamster to an organ donor and from the donor to four transplant recipients. To prevent human illness, the pet trade should consider measures to detect and minimize LCMV infection in commercial pet populations, and the public should be educated about minimizing the risk of infectious transmission from pets.

Keywords: lymphocytic choriomeningitis, organ transplant, hamster, pet trade

Multicounty *Salmonella enteritidis* Outbreak Caused by Tomatoes: Rapid Detection of Cases by Using Multiple-Locus, Variable-Number Tandem Repeat Analysis 9:35 a.m.

Authors: Jean Yuan, K. Schrader, J. O'Connell, P. Killoran, B. Yee, J. Schneider, M. Tran, J. Mohle-Boetani

Background: In July 2005, we identified two restaurant-associated clusters of *Salmonella enteritidis* (SE) infections caused by an unusual strain (phage type-30 [PT30]) and a statewide three-fold increase in SE infections, compared with July 2004. Although most SE outbreaks are associated with eggs, the only previous SE PT30 outbreak, in 2000, was caused by raw almonds from California (CA). We conducted an investigation to determine if the increase in SE was attributable to PT30 and if a food vehicle was associated.

Methods: We defined a case as culture-confirmed SE PT30 infection in a CA resident, with illness onset in July. To rapidly detect cases, we developed a multiple-locus variable number tandem repeat analysis (MLVA) assay and compared the assay to pulsed-field gel electrophoresis (PFGE), the laborious standard method for strain-typing bacteria. We conducted a case-control study among case-patients aged 20–60 years. Control subjects were matched by telephone exchange and identified through sequential digit-dialing.

Results: We identified 39 case-patients (median age: 24 years) with onsets July 1–18, who resided in 17 counties in CA. MLVA accurately identified case-patients and was six times faster than PFGE. Case-patients (n=15) were more likely than controls (n=30) to have dined at a Mexican restaurant (OR:5.5; 95% confidence intervals [CI]=1.4–21.7) and to have eaten fresh salsa in a restaurant (OR:6.0; 95% CI=1.5–23.7). Cilantro and tomatoes were in the fresh salsa; only the tomato traceback investigation indicated a common supplier.

Conclusions: This is the first SE outbreak associated with tomatoes; the source of contamination with this rare strain of SE merits further investigation. MLVA is a promising technique for rapid strain-typing in the context of *Salmonella* outbreaks.

Keywords: *Salmonella enteritidis*, tomato, Variable Number of Tandem Repeats, outbreaks, *Salmonella* food poisoning

Delayed Onset *Pseudomonas fluorescens* Group Bloodstream Infections After Exposure to Contaminated Heparin Flush — Michigan and South Dakota, 2005 9:55 a.m.

Authors: Mark D. Gershman, C. Kim, E. Wells, M. Wilkins, J. Rudrik, J. Clayton, J. McHale, M. Arduino, B. Jensen, J. Noble-Wang, A. Srinivasan

Background: A case of *Pseudomonas fluorescens* catheter-related bloodstream infection (BSI) was reported in a Michigan patient previously exposed to a contaminated heparin flush product. BSI occurred 237 days after last possible product use in February 2005, when the product was recalled after a multistate investigation. We sought to determine the source of delayed infection and identify additional cases.

Methods: We defined a case as receipt of the implicated flush before product recall and culture-confirmed BSI after February 4, 2005. BSI was diagnosed by blood or catheter cultures positive for *P. fluorescens* group. Cases were identified by review of clinical microbiology reports; charts were reviewed for clinical characteristics. Pulsed-field gel electrophoresis (PFGE) was performed to determine similarities among the outbreak isolates.

Results: Fifteen patients met the case definition; all were adult oncology outpatients with implantable venous ports. All experienced chills with or without fever ≤8 hours after port flushing. All patients were treated with oral antibiotics, and all had their ports surgically removed; no deaths were reported. The mean time from product recall to diagnostic specimen collection was 185 days (range: 116–279 days). *P. fluorescens* group was recovered from 9/9 blood cultures and 10/12 (83%) catheters. PFGE results for 11/11 available isolates were indistinguishable from the February outbreak pattern.

Conclusions: Patients with venous ports exposed to contaminated heparin flushes are at risk for BSI months after product use has been discontinued, presumably because of persistent bacterial colonization of catheter biofilms. When immunocompromised patients experience BSI, aggressive therapy is required, including possible removal of venous ports. Symptomatic surveillance for BSIs among patients with indwelling catheters should continue even after contaminated injectable products are removed from use.

Keywords: *Pseudomonas fluorescens*, drug contamination, heparin, infection, indwelling catheters

Thursday, April 27, 2006
Session N: Why Can't We All Just Get Along?: Illness Associated with Mass Gatherings
Grand Ballroom
10:30 a.m.–12:00 p.m.
Moderator: Robert Tauxe

Surveillance at an Outdoor Mass Gathering — Virginia, 2005
10:35 a.m.

Authors: Elizabeth Melius, S. Sandhu, J. Cheek, D. Wong, P. Young, M. Coletta, L. Dewey, M. White-Russell, T. Powell, D.Toney

Background: Implementing surveillance at mass gatherings might help to detect natural outbreaks or possible terrorism and enable prompt public health intervention. We implemented surveillance during an 8-day camping event (July 25–August 1) sponsored by a national youth organization, to monitor disease and injury among ~43,000 attendees.

Methods: Campers were screened for illness upon arrival. Daily syndromic surveillance, along with active visits and relationship building with camp medical staff, was conducted at the camp's 25 medical stations. Daily incidence for specific health events was calculated. Specimens were collected for laboratory confirmation during gastrointestinal disease (GI) outbreaks.

Results: Overall, 14,857 events were identified during July 24–August 2 among ~43,000 attendees. These events included 3,486 (23%) heat-related conditions; 2,795 (19%) injuries; 964 (6%) GI problems; 1,016 (7%) respiratory problems; 453 (3%) tick bites; 1,377 (9%) other bites/stings; 417 (3%) rashes; 290 (2%) infectious diseases; 96 (0.6%) cardiovascular problems; and 3,959 (27%) other syndromes. Initial screening detected two GI outbreaks among arriving groups (attack rates [AR]: 40% [16/40] and 48% [38/80], respectively). Syndromic surveillance alerted staff to a third group with GI illness (AR: 38%; 15/40). A call from a camp physician led to identification of a fourth GI outbreak (AR: 10%; 4/40). Of six stool specimens tested, four (67%) were positive for norovirus by using reverse transcription-polymerase chain reaction.

Conclusions: A combination of screening, active surveillance, and syndromic surveillance detected a major communicable disease outbreak at this mass gathering. Because screening was effective in detecting existing GI outbreaks among arriving participants, such screening should be considered at similar events.

Keywords: syndromic surveillance, mass gathering, screening, norovirus

Norovirus Outbreak After a Vomiting Episode in a Hotel — Omaha, Nebraska, 2005
10:55 a.m.

Authors: Anand A Date, A. O'Keefe, T.J. Safranek, K.J. Schwab, C.McCall, D. Leschinsky, C. Allensworth, P. Friend

Background: Exposure to contaminated environmental surfaces has been implicated in norovirus transmission, in addition to foodborne transmission. On September 25, 2005, Nebraska Health and Human Services System was notified of gastrointestinal illness among meeting attendees at a hotel during September 22-23. We investigated this outbreak to ascertain its extent, to identify the mode of transmission, and to characterize risk factors for illness.

Methods: We conducted a retrospective cohort study of meeting attendees and hotel employees by using an Internet questionnaire to collect demographic data, illness characteristics, and food and other exposures. Stool specimens from ill persons were tested for potential pathogens. A patient was any meeting attendee or hotel employee with vomiting or diarrhea or ≥3 of the following during September 23-26: nausea, abdominal cramps, fever, headache, or chills.

Results: Survey response rate for the attendees and hotel employees was 78% (301/386) and 80% (144/180), respectively. Attack rates were 58% (174/301) and 21% (30/144) respectively. The index patient was an attendee with precipitous vomiting in a carpeted restroom on the morning of September 23; the next person became ill 12 hours later. Mean incubation period was 34 hours (range=12–77 hours). Norovirus Group II was identified in two stool samples and contaminated carpet. Multivariable logistic regression model indicated that illness among attendees was significantly associated with eating the hotel-provided lunch (adjusted odds ratio [AOR]=8.0; 95% confidence interval [CI]=3.6–18.0) and restroom use after the vomiting episode both on September 23 (AOR=2.8; 95% CI=1.4–5.5).

Conclusions: This outbreak was likely caused by exposure to vomitus from the index patient. To reduce norovirus contamination after vomiting incidents at public venues, facilities should use strict environmental decontamination procedures.

Keywords: norovirus, outbreak, vomiting, environmental decontamination

A Walk in the Woods: Injury and Violence Surveillance at the Annual Gathering of the Rainbow Family of Living Light — West Virginia, 2005
11:15 a.m.

Authors: Robert M. Bossarte, E. Sullivent, J. Sinclair, D. Bixler, T. Simon, A. Crosby

Background: In summer 2005, approximately 10,000 members of a large counterculture group, the Rainbow Family of Living Light, held their annual gathering in rural West Virginia. Due to preliminary reports of disruptive and violent behavior, West Virginia Department of Health and Human Resources requested assistance from the Centers for Disease Control and Prevention (CDC) to assess injuries and violence associated with the gathering.

Methods: Active surveillance was established in emergency departments within 80 miles of the gathering site. Participating emergency departments flagged records of patients associated with the gathering. A 38-item health and risk questionnaire was administered in camping areas to a convenience sample of participants. Other data sources included state and local law enforcement arrest records and interviews with 18 gathering-affiliated health care providers.

Results: Of the 102 emergency department patients identified, 65% were seen for an illness, 26% for an unintentional injury, and 9% for a violence-related injury. The health and risk questionnaire was completed by 64% of the 136 participants approached. Among those, 77% reported drug use and 49% reported binge drinking in the last 30 days. Another 13% reported lifetime sexual assault victimization. All 32 arrests/citations reported by law enforcement agencies were for nonviolent offenses. On-site health care providers reported primarily treating minor exposure-related conditions (e.g. blisters, insect bites, ankle injuries).

Conclusions: Despite numerous risk behaviors and substance use, few instances of violence were reported. Thus, extensive surveillance for violence related injuries may not be warranted. Plans for future gatherings should include preparations for the broad range of exposure-related illnesses/injuries common at the gathering and address preexisting conditions and risk exposures common among participants.

Keywords: violence, risk factors, substance use, assessment of healthcare needs

Oropharyngeal Carriage of *Neisseria meningitides* Serogroup Y During an Outbreak at a Residential Training Facility — Utah, 2005
11:35 a.m.

Authors: Diane K. Gross, C. Porucznik, S. Mottice, C. Fisher, L. Smith, P. Luedtke, B. Hatch, S. Schmink, M.J. Hughes, M. Fischer, R. Rolfs

Background: Among adolescents and young adults, meningococcal disease is a serious cause of morbidity and mortality, and new recommendations for routine vaccination of adolescents have recently been published. Ten percent of healthy individuals are carriers of *Neisseria meningitidis* (NM); and disease is associated with acquisition of carriage. In 2005, three cases of *Neisseria meningitidis* serogroup Y (NMY) occurred among 1,200 students at a residential job training program in Utah. We evaluated NMY carriage as part of the outbreak investigation.

Methods: Oropharyngeal swabs were obtained for culture from a random sample of students who completed a standardized questionnaire. NM isolates were serogrouped by slide agglutination. Multivariable logistic regression was performed to determine factors associated with NMY carriage.

Results: Among 566 students enrolled, median age was 20 years (range 18-26 years), 78% were male and 60% smoked. Carriage of NM and NMY occurred in 25% and 16% of students, respectively. Age, gender, race, smoking status, respiratory infection, prior antibiotic use, type of job training program, and duration and type of residence were not significant risk factors for NMY carriage ($P>0.05$). When compared to no NM carriage, students entering the program in the summer and fall were more likely to have NMY carriage than those entering during the winter and spring (odds ratio 2.2; 95% CI 1.4-3.5).

Conclusions: The high carriage rates and lack of modifiable risk factors support recommendations for chemoprophylaxis and vaccination of these students in response to the outbreak. The potential benefit of routine meningococcal vaccination in such residential settings should be explored.

Keywords: meningococcal disease, carriage, outbreak, vaccination, risk factor, residential facility

Thursday, April 27, 2006
Session O: As Easy as Falling Off a Ladder: Injury
Grand Ballroom
1:30 p.m.- 3:15 p.m.
Moderator: Ileana Arias

Unintentional Motor-Vehicle–Train Collisions — Oklahoma, 1995–2003
1:35 p.m.

Authors: Sara J. Russell, S. Mallonee

Background: Rates of persons injured or killed in motor-vehicle (MV)–train collisions in Oklahoma (1.36/100,000 population) are approximately 3 times the national rate (0.48/100,000 population). To identify and evaluate prevention measures, we studied unintentional MV-train collisions in Oklahoma.

Methods: We collected information on MV-train collisions during 1995–2003 from the Federal Railway Administration and from statewide medical examiner reports. Intersections were classified into train-activated gates, train-activated flashing lights, and passive signage (crossbucks or stop signs). For each type of intersection, MV-train collisions were calculated as the average annual number of collisions/1,000,000 vehicles/100,000 trains passing through the intersection.

Results: A total of 601 unintentional MV-train collisions occurred; 49% had at least one injury or death. Twenty-six percent of drivers were aged <25 years, compared with 16% of registered drivers in Oklahoma (relative risk [RR]: 1.7; 95% confidence interval [CI]=1.4–2.0); 74% of drivers were male, compared with 49% of registered drivers in Oklahoma (RR: 1.5; 95% CI=1.4–1.6). Of drivers involved in collisions in intersections with gates, 86% ignored the gate warning. Of fatalities tested for the presence of alcohol, 22% were legally intoxicated. The average annual intersection collision rate with passive signage was 40.7, approximately 20 times the rate of both train-activated gates and train-activated lights (2.2).

Conclusions: Intersections with passive signage had substantially higher collision rates than those with active warnings. Education campaigns can focus on the higher risk among younger male drivers and on preventable risk behaviors (i.e., ignoring warnings or alcohol use). Increasing the number of intersections with active warnings and instituting structural changes (i.e., gates that close across both lanes of traffic) might reduce the number of MV-train collisions in Oklahoma.

Keywords: railroad, motor-vehicle collisions, Oklahoma

Identifying Predictors of Suicide Attempts Among Adolescents — Oregon, 2002–2003
1:55 p.m.

Authors: Clinton C. Haley, K. Hedberg, M. Kohn

Background: Since 1982, Oregon's adolescent suicide rate (7.9/100,000) has averaged 25% higher than the national rate (5.9/100,000). Studies report that previous attempts increase suicide risk. We analyzed data from Oregon's adolescent suicide attempt registry (ASAR) to identify factors associated with prior attempts.

Methods: By using the 2002–2003 ASAR data, we analyzed the number of prior suicide attempts (zero compared with one or more prior attempts) by potential suicide predictors, including demographic characteristics, attempt method, mental disorders, social problems, and substance abuse. Significant risk factors from univariate analysis were analyzed by using backwards-stepping logistic regression.

Results: The registry included 1,146 attempts, of which 858 (75%) were among females; 952 (86%) were among whites; and median age was 15 years (range: 7–17 years). Attempt methods included 862 (75%) by ingesting drugs or toxins and 284 (25%) by violent means (e.g., firearms or cutting). Prevalence of predictors included mood disorders (53%), social problems (25%), alcohol or drug abuse (17%), sexual or physical abuse (7%), posttraumatic stress disorder (PTSD) (6%), death or suicide of a friend/relative (4%), and prior arrest (4%). Risk factors and their adjusted odds ratios (OR) in the final regression model included mood disorder (OR: 3.8; 95% confidence interval [CI]=2.9–4.9), PTSD (OR: 2.2; 95% CI=1.2–3.8), prior arrest (OR: 3.2; 95% CI=1.6–6.6), and being female (OR: 1.5; 95% CI=1.1–2.1).

Conclusions: Although cross-sectional in design, our study demonstrates that mood disorders, PTSD, and prior arrests are associated with a history of multiple suicide attempts. With multiple attempts increasing the risk for dying by suicide, intervention efforts should focus on adolescents with these risk factors.

Keywords: suicide, attempted suicide, adolescent, risk factors

Restraint Use for Child Passengers Decreases Risk of Hospitalization and Multiple Injuries
2:15 p.m.

Authors: Karen C. Lee, A. Dellinger, A. Greenspan, T. Haileyesus, R. Shults

Background: In 2004, >214,000 children aged <15 years were injured as passengers in motor vehicle crashes (MVCs). Previous surveillance for MVC injuries among children has included only principal injury diagnoses and/or parental reports of injuries.

Methods: We expanded the National Electronic Injury Surveillance System for children aged ≤12 years seen in emergency departments (EDs) at 15 hospitals nationwide after MVCs in 2004. This included collecting multiple injury diagnoses from ED records and interviewing parents about MVC circumstances. Restraint use was classified as unrestrained or restrained; appropriateness of restraint type was determined using child's age, weight, and/or height.

Results: Of 649 children injured in MVCs, 9% were unrestrained, and 37% were inappropriately restrained. African Americans and Hispanics were nearly seven times as likely as Non-Hispanic Whites and Asian Americans to be unrestrained (13% vs. 2%). SiSS xty-two percent of inappropriate restraint use occurred among children aged 3-8 years prematurely placed in lap/shoulder belts. Of vehicle types, trucks most frequently had unrestrained children (24% vs. 8% other vehicles). About 75% of children had one injury diagnosis; 19%, 3%, and 0.8% had two, three, and four diagnoses, respectively. The most common diagnoses were contusions/abrasions (52%), sprains/strains (19%), internal injuries (9%), lacerations (7%), and fractures (4%). Almost 9% of children required hospital admission. Children with multiple diagnoses were almost twice as likely to be unrestrained as children with one diagnosis (14% vs. 8%). Unrestrained children were three times as likely as restrained children to be hospitalized (21% vs. 7%).

Conclusions: Restraint use should be promoted for child passengers, particularly among African Americans, Hispanics, and those in trucks. Restraints can decrease risks of hospitalization and multiple injury diagnoses among child passengers.

Keywords: motor vehicles, child, wounds and injuries, minority groups

State Trauma Registry Assessment — Wyoming, 2000–2005
2:35 p.m.

Authors: Richard Luce, J. Mayberry, T. Murphy

Background: In Wyoming, injury is the fourth leading cause of death and results in the largest loss of productive years of life. We analyzed Wyoming trauma registry data to estimate the overall public health burden of injury hospitalization and propose community-based interventions to decrease incidence.

Methods: The 25 hospitals in Wyoming report qualifying cases to the Wyoming Trauma Registry. Case criteria include one or more *International Classification of Diseases, Clinical Modifications* (Rev. 9) diagnosis codes of 800–959.9 and hospitalization for >24 hours. We analyzed injury cases occurring during January 1, 2000–September 30, 2005, by age, sex, year, and injury category.

Results: The trauma registry contained data on 11,677 cases (incidence: 4.7/1,000/year); 65% were male. Mean age was 36.3 years (range: <1–100). Thirty-one percent of patients were aged 20–49 years; 28% were aged 40–59 years. The highest trauma incidence occurred among persons aged 16–19 years (incidence: 7.7/1,000/year). Overall, 39.2% of traumatic injuries occurred during motor-vehicle crashes (MVCs) and 20.0% from falls. Incidence of MVC-related injury hospitalization was highest among persons aged 16–19 years (incidence: 4.4/1000/year); incidence of fall-related injury hospitalization was highest among persons aged ≥65 years (incidence: 1.9/1000/year). Injuries associated with riding or working around animals accounted for 6.3% of entries.

Conclusions: Interventions to reduce MVC-related trauma (e.g., primary seat-belt laws) could substantially reduce overall injury rates. Other interventions, including personal safety equipment use when riding animals, should be evaluated for Wyoming residents.

Keywords: trauma, trauma registry, injury, Wyoming

Injuries from Motor-Vehicle Collisions with Moose — Maine, 2000–2004
2:55 p.m.

Authors: Araceli Rey, A. Pelletier

Background: Maine's moose population (approximately 29,000) is the largest in the lower 48 states. Motor-vehicle collisions with moose are responsible for substantial injury and vehicle damage, accounting for 50% of injuries and 82% of deaths involving crashes with animals in Maine. We conducted an investigation to determine characteristics of these events.

Methods: Reports submitted by state, county, and local police agencies on motor-vehicle collisions involving moose were obtained from the Maine Department of Transportation for 2000–2004. Rates were calculated by using population estimates from the 2000 U.S. census.

Results: During the 5-year study period, 3,400 motor-vehicle–moose collisions were reported, averaging 680 collisions/year. The rate of motor-vehicle–moose collisions was 53/100,000 persons/year, with a range of 7–310 collisions/100,000 persons/year for Maine's 16 counties. Of the 5,417 motor-vehicle occupants involved in collisions, 1,007 (19%) persons were injured, including 16 (<1%) fatalities. The mean age for drivers was 43 years (range: 15–90 years). Seventy-three percent of drivers were male. Only 1% of drivers were determined to be under the influence of drugs or alcohol. Ninety percent of collisions occurred at speeds ≥40 miles/hour. Seventy-nine percent of these crashes occurred during the 6-month period of May–October. Seventy-eight percent of crashes occurred during 6 pm–6 am.

Conclusions: Collisions with moose varied widely by county and indicated clear patterns by time of day and season. Individual driver characteristics such as age and alcohol consumption did not appear to be contributing factors. These findings should be taken into consideration when developing better prevention and control measures to reduce collisions and injuries.

Keywords: moose, motor-vehicle collision, crash, injury, Maine

Thursday, April 27, 2006
Session P: So What Did You Have for Lunch?: Foodborne Disease
Grand Ballroom
3:30 p.m.–5:00 p.m.
Moderators: Fred Angulo and Sharon Balter

Investigation of a Multistate Outbreak of *Escherichia coli* O157:H7 Illness — United States, 2005
3:35 p.m.

Authors: Nicholas H. Gaffga, J. Sobel, A. Cronquist, T. Nguyen, M. Joyner, C. Bopp, P. Gerner-Smidt, L. Carpenter, M. Lemaile-Williams

Background: Each year an estimated 73,000 illnesses and 61 deaths are caused by the foodborne pathogen *Escherichia coli (E. coli)* O157:H7. Contaminated beef used to prepare ground beef is a significant source of human infection, and the centralized process has the potential to contaminate large volumes of ground beef. In July, 2005 we identified a cluster of 11 isolates of *E. coli* O157:H7 from patients and a ground beef sample consumed by one patient, all indistinguishable by pulsed-field gel electrophoresis (PFGE).

Methods: Patients with isolates demonstrating the outbreak PFGE pattern were included in the outbreak. We interviewed patients and sought ground beef samples from their homes. The USDA Food Safety and Inspection Service conducted traceback and plant investigations based on ground beef purchasing and packaging information.

Results: We identified 63 patients in the outbreak. Opened packages of raw ground beef collected from two homes yielded *E. coli* O157:H7 isolates with the outbreak PFGE pattern. Information from this investigation led to two recalls of implicated ground beef products processed by one grinding plant. Traceback to slaughter plants was limited by inadequate records and package labels. The ultimate sources of contaminated ground beef could not be determined. Additional linked illnesses with isolates demonstrating the outbreak PFGE pattern occurred after the recalls.

Conclusions: Improved record keeping would facilitate tracing ground beef back to slaughter plants and could lead to more efficient and timely removal of contaminated meat from circulation. Several large ground beef retailers require certification from processors that meat they are purchasing tests negative for *E. coli* O157:H7 prior to shipment. More generalized adoption of this industry practice could reduce foodborne illness due to this pathogen.

Keywords: *E. coli* O157:H7, ground beef, foodborne, traceback, disease, outbreak

Suspected Paralytic Shellfish Poisoning — Corinto, Nicaragua, 2005
3:55 p.m.

Authors: Laura Conklin, A.C. Melendez Darce, E. Azziz-Baumgartner, L. Callejas, H. Schurz-Rogers, N. Gaffga, G. Luber, M. Patel, M. Earley, J. Mei, C. Rubin

Background: From November 4-15, 2005, the Ministry of Health in Nicaragua (MINSA) identified 45 persons who became ill after eating shellfish and issued a ban on their consumption and harvesting. As shellfish is a local diet staple, the ban had immense public health and economic implications. Laboratory testing of shellfish implicated saxitoxins, which are responsible for the potentially fatal disease paralytic shellfish poisoning (PSP). To verify the cause of illness and identify risk factors, CDC assisted MINSA in investigating the outbreak.

Methods: We identified an island community at high-risk for toxin exposure and conducted a cross-sectional assessment of its 107 inhabitants on November 15. Details of seafood consumption and symptomatology were recorded. The outcome measure was PSP (i.e. developing ≥1 neurologic complaint: weakness, floating sensation, paresthesias, dyspnea, dysphagia, dysphasia or altered vision) within 24 hours of ingesting seafood between November 4 -15. CDC analyzed urine samples using a novel enzyme-linked immunoassay modified for human urine matrix.

Results: Twenty-six (24%) of the island's population reported eating *concha negra* clams. Of these, 10 (38%) had PSP and five required hospitalization. Eating clams was a significant risk factor for developing PSP (RR=∞, $p<0.001$). Increased consumption of clams was associated with increased severity of illness. Saxitoxin identified in the urine of a symptomatic person confirmed PSP. Shellfish and seawater analyses are ongoing.

Conclusions: These findings link ingestion of *concha negra* clams to clinical PSP and the presence of urine saxitoxin. No further cases of PSP have been identified since implementation of MINSA's shellfish ban. Our results support continuing PSP surveillance and the shellfish ban until food safety is established and no saxitoxin is detected in shellfish and seawater samples.

Keywords: paralytic shellfish poisoning, saxitoxin, Nicaragua, concha negra, *Polymesoda inflata*

Recurrent Outbreak of *Salmonella* Newport Associated with Tomatoes — Eastern and Central United States, July–September, 2005
4:15 p.m.

Authors: Sharon K. Greene, E. Gagnon, E. Talbot, S. Holzbauer, L. Demma, N. Patel, C. Braden, J. Painter, S. Newport Outbreak Working Group

Background: *Salmonella* Newport is the third most common *Salmonella* serotype causing human illness in the United States, and its incidence is increasing. In 2005, PulseNet, a national bacterial subtyping network, identified 52 *Salmonella* Newport isolates in 14 states with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns that matched another outbreak associated with tomatoes from Virginia in 2002. No antimicrobial resistance was found.

Methods: We conducted a case-control study, and defined a case as illness in a patient aged 18 to 70 with onset August 8 to September 12, 2005, with a *Salmonella* Newport isolate demonstrating the outbreak PFGE pattern. Controls were case-patients' well neighbors, located through a reverse telephone directory. Food history for seven days before a patient's illness was obtained for patients and controls.

Results: We enrolled 30 case-patients and 155 controls from 10 states. Patients were more likely than controls to have eaten in restaurants (odds ratio [OR]=13.5, 95% confidence interval [CI]: 3.9, 46.4). Large, sliced tomatoes were eaten in restaurants by 78% of patients and 47% of controls (OR=3.9, 95% CI [1.4, 11.2]). After excluding variables correlated with eating tomatoes in restaurants, illness was associated only with tomatoes in multivariate analysis (OR=5.8, 95% CI: 1.7, 19.5). A traceback of implicated tomatoes by the U.S. Food and Drug Administration is ongoing; a *Salmonella* Newport isolate from pond water near a Virginia tomato farm sampled in October 2005 matched the outbreak pattern.

Conclusions: The results of this and other recent epidemiological investigations demonstrate that tomatoes continue to be a source of salmonellosis. PulseNet identified two multistate outbreaks caused by a single rare strain three years apart, suggesting persistent contamination within growing fields or production facilities.

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

Use of Detailed Food Exposures Collected as Part of Routine Surveillance in Investigation of a Multistate Listeriosis Outbreak Linked to Turkey Deli Meat — United States, 2005
4:35 p.m.

Authors: Ann M. Schmitz, M. Adams, C. Waters, Q. Phan, S. Hurd, A. Kao, A. Gallagher, P. Jenkins, K. Simeonsson, L. Nathan, L. Bloss, M. Lynch

Background: *Listeria monocytogenes* (LM) causes substantial morbidity and mortality in the U.S. Although lessons from listeriosis outbreak investigations have helped guide regulatory policy, several week delays in food vehicle identification have hindered timely public heath intervention. In August 2005, we investigated an outbreak of LM infections using information routinely collected with a standard questionnaire as part of enhanced surveillance in multiple states.

Methods: We identified cases from pulsed-field gel electrophoresis (PFGE) patterns of LM submitted to CDC via PulseNet. For the case-control study, we defined a case as infection with LM indistinguishable from the outbreak strain by PFGE using two restriction enzymes and illness onset between June 1 and September 30, 2005. Controls were infected with non-outbreak LM strains. Food exposures collected with the standard questionnaire were compared to identify a food vehicle. Product traceback was initiated by state health officials.

Results: Thirteen identified cases included one adult death and one fetal death. Within 11 days, preliminary case-control study results revealed patients were more likely than controls to have consumed turkey deli meat (7 (88%) of 8 patients and 13 (41%) of 32 controls, OR=10.2, 95%CI=1.1-93.3). Limited traceback led to multiple turkey processing plants with no intervention implemented to date.

Conclusions: Turkey deli meat, a source of listeriosis in past outbreaks, was the likely source of a multistate listeriosis outbreak. Use of food exposures routinely gathered as part of surveillance facilitated rapid identification of the food vehicle. To date, traceback has not identified a particular brand or production plant source. Improving surveillance and outbreak investigations can reduce delays in public health response. Continued attention to LM prevention is needed in the processed meat industry.

Keywords: Listeria, disease outbreaks, foodborne illness, surveillance, case-control study

Friday, April 28, 2006
Session Q: And the Band Is Still Playing…: HIV Infection
Grand Ballroom
8:30 a.m.- 10:00 a.m.
Moderator: Tim Mastro

Human Immunodeficiency Virus Seroconversion Among Male Inmates in a State Prison System, 1992–2005
8:35 a.m.

Authors: Krishna Jafa, L. Fitzpatrick, P. McElroy, C. Borkowf, W. Heneine, K. Robbins, R. MacGowan, A. Margolis, Z. Henderson, D. Stratford, E. McLellan-Lemal, A. Greenberg, P. Sullivan

Background: Human immunodeficiency virus (HIV) prevalence is >4 times higher for incarcerated populations than for the general U.S. population. From 1992 through 2005, a state prison system documented 88 HIV seroconversions among male inmates, which we investigated.

Methods: We conducted a matched case-control study of participant-reported HIV risk behaviors among 68 HIV-infected inmates who were seronegative at least 6 months after incarceration and 68 HIV-uninfected control inmates. Match criteria were year of incarceration and sentence length. We used multivariate conditional logistic regression to estimate adjusted odds ratios (AORs) for associations between risk behaviors and HIV seroconversion. To identify drug-resistant mutations in seroconverters' viral isolates, we determined *pol* gene sequences encoding reverse transcriptase and protease regions with ultra-sensitive polymerase chain reaction-based testing.

Results: In multivariate analysis, seroconversion was associated with male-male sex in prison (66% cases versus 13% controls, AOR=10.1, 95% Confidence Interval [CI]=3.0-54.9), receiving a tattoo in prison (59% cases versus 41% controls, AOR=13.7, 95% CI=1.5-390.6), being black (66% cases versus 59% controls, AOR=3.7, 95% CI=1.1-16.7), and having a body mass index of ≤ 25.4 kg/m2 upon incarceration (75% cases versus 34% controls, AOR=3.8, 95% CI=1.2-15.2). Thirty-nine (72%) inmates reporting male-male sex in prison did not report male-male sex in the 6 months before incarceration. Thirteen (30%) inmates reporting consensual sex and three (21%) reporting exchange sex used condoms or improvised barrier methods. Eight (62%) of 13 treatment-naïve seroconverters had drug-resistant viral isolates.

Conclusions: Prison HIV prevention programs should educate inmates on risks of male-male sex. Routine resistance testing and appropriate treatment could reduce transmission of drug-resistant virus. Further research is required to determine the roles of prison tattooing and lower BMI in HIV transmission.

Keywords: HIV infection, HIV seroconversion, prisons, prevalence, drug resistance

Antiretroviral Therapy Among HIV-Infected Children in a Resource-Constrained Setting — Uganda 2004–2005 8:55 a.m.

Authors: Thomas Finkbeiner, E. Luyirika, L. Nabiddo, E. Kikule, K. Kasule, J. Floyd, J. Downing, M. Earp, S. Shinde, A. Namale, R. Nakityo, D. Okullo, J. Mermin, N. Shaffer, J.T. Brooks

Background: A total of 3.1 million deaths annually are attributed to AIDS, including 2.4 million (77%) in sub-Saharan Africa. Although HIV treatment programs are being scaled-up in Africa, few children are receiving life-saving therapy. This is partly due to limited experience with pediatric antiretroviral treatment (ART) in resource-constrained settings. In Uganda, where only about 5% of children eligible for ART are on treatment, we examined data on treatment outcomes from a cohort of HIV-infected children at a specialized HIV center in Kampala.

Methods: We included all children age <13 years who initiated ART from May 2004 through February 2005. We assessed change in CD4 cell percentage (CD4%) and weight gain as indicators for treatment response. We also analyzed survival, adverse events and adherence, as reported by caretakers.

Results: A total of 355 children (50.4% male, median age 8 years; range 9 months - 12 years) were treated for a median of 13.9 months (range 0.4 – 18.5 months). Treatment was initiated with CD4%< 20 and improved by a median of 12 percentage points ($p< 0.001$). Median increase in weight-for-age z-score was 0.42 ($p<0.001$). Nineteen children (5.4%) died, of whom 16 (84%) had advanced disease at the onset of treatment (initial CD4%<10; $p<0.005$). Twenty-eight children (7.9%) had 33 adverse events, including nausea/vomiting (33.3%), rash (24.2%), and neuropsychiatric disorders (18.2%). Most (82%) caretakers reported no drugs missed during the past month.

Conclusions: In this specialized program, pediatric ART was effective and well tolerated. Mortality was low, clinical and laboratory parameters improved and most children stayed on their initial ART regimen. Scale-up of pediatric ART programs should be encouraged, although longer term follow-up data are needed.

Keywords: antiretroviral therapy, HIV, Uganda, Africa, children, infants

Can HIV Incidence Be Estimated from Cross-Sectional Serologic Surveys in Africa: Novel Application of a New HIV Incidence Laboratory Assay 9:15 a.m.

Authors: Andrea A. Kim, B. Parekh, L. Marum, A. Abdullahi, C. Mutura, A. Ekra, M. Borget-Alloue, C. Adje, M. Nolan, S. Wiktor, T. Diaz

Background: The President's Emergency Plan for AIDS Relief aims to prevent two million HIV infections in resource-limited countries by 2010. Therefore, monitoring trends in HIV-incidence is vital to assess the initiative's impact. Currently, HIV-incidence is mathematically modeled from antenatal clinic (ANC) and population-based cross-sectional serologic surveys. The multi HIV-1 peptide (termed "BED") laboratory assay could be used to estimate HIV-incidence in cross-sectional surveys, but its validity in developing countries is unknown.

Methods: The BED assay measures the increasing proportion of HIV-1 IgG in total IgG from HIV-positive sera of multiple HIV-1 subtypes. Sera with normalized optical density values<0.8, corresponding to an estimated seroconversion window period of 155 days, are classified as BED-incident infections. The assay was applied to sera from Cote d'Ivoire's 1998-2004 ANC surveys and Kenya's 2003 population-based survey. Annualized BED-incidence and 95% confidence intervals (CI) were calculated and compared to modeled HIV-incidence assuming a 9-year post-infection mortality rate.

Results: In Cote d'Ivoire, 18% (179/980) of HIV-positive specimens were BED-incident (range: 14%-20%). Annualized BED-incidence was 3.9% (95% CI 3.3–4.5) and 2-4 times higher than modeled HIV-incidence. In Kenya's population survey, 19% (82/432) HIV-positive specimens were BED-incident. Annualized BED-incidence was 3.5% (95% CI 2.6-4.4) and 3 times higher than modeled HIV-incidence. Among women, HIV-prevalence and BED-incidence peaked in the same age group.

Conclusions: BED-incidence was 2-4 times higher than modeled HIV-incidence. To achieve this, a mean post-infection mortality rate would need to be 5 years, which is inconsistent with HIV mortality data from African cohorts. Additionally, BED-incidence should have peaked in earlier age groups than HIV-prevalence. The current BED assay cannot be used to estimate HIV-incidence; however, studies are ongoing to improve its validity.

Keywords: HIV, incidence, laboratory assay, model, surveillance

Evaluation of Acute HIV Infection Surveillance — North Carolina, 2002–2005
9:35 a.m.

Authors: Brant B. Goode, D. Williams, J. Kuruc, M. Davies

Introduction: Acute human immunodeficiency virus (HIV) infection (AHI) is characterized by presence of antigen, absence of antibody, and short-lasting hyperinfectivity. Although AHI is rarely detected, providing prevention counseling to, and eliciting and notifying partners of acutely infected persons might reduce HIV transmission, an important public health benefit. North Carolina (NC) began AHI surveillance in 2001. We evaluated NC AHI surveillance and its potential for implementation in other areas.

Methods: We defined AHI as presence of HIV antigen without detectible antibodies in a person with previously undiagnosed infection. Cases detected by NC AHI surveillance during November 1, 2002–November 29, 2005, were compared with results of standard antibody-based HIV surveillance. We calculated additional yield of AHI surveillance (AHIs/HIV infections detected by antibody-based surveillance) and positive predictive value (PPV) of antigen testing. We evaluated notification and prevention counseling efforts among AHI cases and their partners as well as system requirements through record review and key program staff interviews.

Results: During November 1, 2002–November 29, 2005, AHI surveillance detected 65 AHI patients for an additional yield of 3.9% (95% confidence interval [CI] = 3.0–4.9). PPV of antigen testing within AHI surveillance was 93% (95% CI = 84–98). Staff notified and provided prevention counseling to 59/65 (91%) acutely infected persons and 87 partners. Implementation required confidential venipuncture-based antigen and antibody testing, and ability to prioritize AHI-related notification and prevention counseling. Access to specialty medical care promoted AHI client trust.

Conclusions: AHI surveillance improved detection and allowed earlier prevention efforts among persons with AHI and their partners. Areas considering AHI surveillance should assure existence of sufficient laboratory, partner notification, and prevention counseling services as well as accessible specialty medical care.

Keywords: HIV, AIDS, prevention, acute infection, surveillance

Friday, April 28, 2006
Session S: New Kids on the Block: Emerging Infectious Disease
Grand Ballroom
1:30 p.m.- 3:15 p.m.
Moderators: Paul Effler and Sarah Park

Severe *Clostridium difficile*-Associated Disease Among Populations Previously at Low Risk — Multiple States, 2005
1:35 p.m.

Authors: Felicia M. T. Lewis, L. Wiggs, G. Killgore, A. Thompson, A. Weltman, C.C. Johnson, E. Chernak, L.C. McDonald

Background: *Clostridium difficile*-associated disease (CDAD) usually presents as diarrhea among older hospitalized patients exposed to antimicrobials and is an important cause of morbidity among this group. After reports of CDAD among patients with minimal or no hospital exposure, we investigated whether severe CDAD was occurring among populations previously at low risk.

Methods: During May–June 2005, case definitions were developed, and a request for voluntary reporting was distributed. Open-ended interviews of patients were performed. Available stool samples were cultured; isolates underwent toxinotyping, pulsed-field gel electrophoresis (PFGE), detection of binary toxin, and detection of a deletion in a toxin-negative regulatory gene (*tcdC*). The minimum population rate and rate per antimicrobial prescription of community-associated CDAD (CA-CDAD) were estimated.

Results: Ten peripartum and 23 nonperipartum cases were reported, including 11 (33.3%) in patients aged <18 years. Symptoms were present at the time of investigation among 21 (63.6%) patients. Transmission to close contacts occurred among 4/33 (12.1%). Eight (24.2%) reported no antimicrobial exposure within >3 months; another 9.1% contracted CDAD after 3 doses of antimicrobials. Fifteen (45.5%) required hospitalization or an emergency department visit. Thirteen (39.4%) suffered relapse. One fatality occurred. Minimum estimated incidence was 7.4/100,000/year with one case/5,549 outpatient antimicrobial prescriptions. Both available isolates were toxinotype variants and possessed binary toxin. One had a PFGE pattern similar to a recent epidemic strain; the other had a deletion in *tcdC* that can cause increased toxin production.

Conclusions: Previously uncommon clinical and microbial features of CDAD might be increasing. Population-based surveillance should be conducted to determine risk factors for and prevalence of CA-CDAD. Clinicians should consider CDAD as a cause of severe diarrhea, even among patients without traditional risk factors.

Keywords: *Clostridium difficile*; enterocolitis, pseudomembranous; diarrhea; communicable diseases, emerging

International Investigation of a Marburg Hemorrhagic Fever Outbreak — Uíge, Angola 2005
1:55 p.m.

Authors: Romulo Colindres, for the Angola Marburg Response Team

Background: Marburg virus causes an often fatal, hemorrhagic febrile illness. No vaccine or specific treatment is currently available. In mid-March 2005, World Health Organization (WHO) representatives were alerted to a possible viral hemorrhagic fever outbreak in northern Angola. An international team from WHO, CDC, and the Angolan Ministry of Health were deployed to conduct epidemiologic surveillance, implement infection control measures, and provide laboratory diagnosis.

Methods: Teams administered a one-page survey and conducted active surveillance by investigating community notifications of suspected cases. Cases were either laboratory confirmed, had MHF-compatible symptoms or were epidemiologically linked. Data were collected in an Epi-Info database for descriptive analysis. A system of triage and infection control measures was implemented at UPH. Education campaigns were initiated.

Results: The outbreak occurred from October 2004 to August 2005 and resulted in 374 cases of MHF, including 329 deaths (case fatality rate = 88%). Of these, 159 were laboratory confirmed. Fifty-nine percent of cases were female; median age was 22 years (range 6 months - 88 years). In the initial five months 67% of cases were <15 years old; many suspected to have resulted from nosocomial transmission. Ninety-two percent of all cases had fever, 66% hemorrhaging, and 60% diarrhea. Commonly observed risk behaviors included: direct contact with ill individuals, participating in traditional burial practices, and receiving injections or scarification with reused needles or razor blades. No additional cases due to nosocomial transmission were detected at UPH following institution of proper infection control measures.

Conclusions: Nosocomial transmission may have initially amplified the virus in a pediatric population. Implementing infection control measures, establishing safe burial, and public education about not reusing needles and razors, likely contributed to controlling the outbreak.

Keywords: Marburg virus, viral hemorrhagic fever, Angola

Persistence of Antibody to Hepatitis E Virus and Occurrences of Sporadic Hepatitis E Infection — México, 1986–1995
2:15 p.m.

Authors: Ryan T. Novak, J. Drobeniuc, M.C. González, G. Olaiz, C.N. Shapiro, Ó. Velázquez, B.P. Bell

Background: Hepatitis E virus (HEV) is an enterically-transmitted infection which is the leading cause of epidemic viral hepatitis worldwide. An improved understanding of the epidemiology of HEV, including antibody persistence and the extent of sporadic transmission, is important to determine uses for a newly-developed vaccine. We conducted a follow-up serologic survey in México after a single 1986-87 hepatitis E outbreak.

Methods: During the outbreak, sera were obtained from persons with clinical hepatitis who resided in three villages in Morelos, México. Follow-up sera were obtained in 1995 from these individuals, and from a convenience sample consisting of 50% of all village children aged 1-9 years (born after the outbreak). Demographic and clinical data were obtained by interview using a standardized questionnaire. Both initial and follow-up sera were retrospectively analyzed for IgG anti-HEV using an enzyme immunoassay.

Results: Follow-up sera were obtained from 53 persons whose initial serologic specimens were IgM and IgG anti-HEV+ indicating acute hepatitis E. At follow-up, their median age was 34 years (range 13-72); 35 (66%) were female. A total of 52 (98%) were IgG anti-HEV +. Of 240 children 1-9 years of age, 19 (8%) were IgG anti-HEV +; none reported a history of hepatitis. Children 5-9 years old were not more likely to be IgG anti-HEV+ than children 1-4 years (14/142 [10%] vs. 5/98 [5%]; Prevalence Ratio=2.0; 95% Confidence Interval=0.8-5.5).

Conclusions: This is the largest follow-up study demonstrating anti-HEV persistence for at least nine years after acute infection in most persons. Sporadic unrecognized HEV transmission occurs in this area of México during non-epidemic years suggesting a potential role for hepatitis E vaccination.

Keywords: viral hepatitis, hepatitis E virus, outbreak, antibody, IgG anti-HEV

Lymphocytic Choriomeningitis Virus Testing and Diagnosis — Connecticut, 2005
2:35 p.m.

Authors: Lynn E. Sosa, J. Hadler

Background: In April 2005, lymphocytic choriomeningitis virus (LCMV) was implicated in the deaths of three organ transplant recipients in New England. Incidence of clinically significant LCMV disease is unknown. We conducted two surveys to assess occurrence and awareness of LCMV in Connecticut (CT).

Methods: Hospital laboratories were surveyed by telephone to determine how often LCMV tests had been requested during the last 5 years. Test results were collected. In an e-mail survey, CT's Health Alert Network infectious disease physicians were asked if they had considered a diagnosis of LCMV and tested patients for LCMV during the last 5 years. They were also posed scenarios in which they might consider the diagnosis.

Results: All 30 hospital laboratories in CT participated. None perform LCMV testing; 29 (97%) refer specimens to the state laboratory or another referral laboratory. Two referral laboratories have performed LCMV testing for CT hospitals during the last 5 years; neither has confirmed the diagnosis among ~30 samples. Of 35 physicians, 28 (80%) responded. Although 17 (63%) reported considering a diagnosis of LCMV during the last 5 years, of these, only nine (53%) reported testing a patient for LCMV, and none had confirmed a diagnosis. Most physicians would consider the diagnosis among patients exposed to wild mice (92%), healthy pet rodents (96%), or sick pet rodents (96%). Only 25% would consider LCMV in an immunocompromised patient with an unexplained febrile illness and no known exposure history.

Conclusions: LCMV infection is either rare or underrecognized. Possible reasons for underrecognition include infrequent testing and lack of awareness of susceptible populations (e.g. immunocompromised patients). Actively offering testing through state laboratories might facilitate diagnosis and increase understanding of LCMV.

Keywords: LCMV, immunocompromised, diagnosis, organ transplants

Transmission of West Nile Virus Through Solid-Organ Transplantation — New York and Pennsylvania, 2005
2:55 p.m.

Authors: Benjamin Tsoi, M.Campbell, E. Lumeng, J. Ackelsberg, E. DeBernardo, L. Teperman, R. Lanciotti, J. Sejvar, L. Petersen, M. Kuehnert, T. Smith, A. Fine

Background: Organ donors are not routinely screened for WNV. In September 2005, two transplant recipients from a common organ donor experienced encephalitis and acute flaccid paralysis, prompting an investigation of potential West Nile virus (WNV) transmission through organ transplantation.

Methods: We collected clinical and epidemiologic data on the organ donor and four recipients. Remaining tissues, cerebrospinal fluid (CSF), and blood samples from the donor and four recipients were tested for WNV IgM and IgG by enzyme immunoassay and for RNA by nucleic acid-amplification tests.

Results: WNV infections were identified in three of four organ recipients and the donor. The donor reportedly was febrile 1–2 weeks before organ donation, and retrospectively tested serum from the day of organ procurement was positive for WNV IgM and IgG, but negative for WNV RNA. Two infected recipients experienced neuroinvasive disease (one died); the third remains asymptomatic. The liver recipient's serum was positive for WNV IgM and CSF for WNV RNA. The lung recipient's serum and CSF were positive for WNV IgM and IgG. Serum from the asymptomatic kidney recipient, tested 22 days posttransplant, was positive for WNV RNA.

Conclusions: This represents the second report of WNV transmission through organ transplantation. Unlike the first report in which the organ donor was viremic at donation, this donor did not have detectable viremia, but was antibody-positive at donation. Transmission through organ transplantation can occur in the presence of antibody without detectable viremia. As screening strategies are considered, our investigation demonstrates that both WNV IgM and RNA testing might be needed to detect infected organ donors. Clinicians should be alert for WNV infections among transplant recipients, particularly during WNV season.

Keywords: West Nile virus, encephalitis, organ transplantation, transmission

A
Nelson Arboleda 12, 72
Rana Jawad Asghar 9, 51

B
Wendy Bamberg 12, 73
Elizabeth Baraban 6, 34
Pennan Barry 9, 54
Ezra Barzilay 7, 35
Rebecca Bitsko 6, 33
Robert Bossarte 16, 87
Matthew Breiding 6, 32
Deron Burton 11, 66
Lauren Burwell 7, 40

C
Kevin Cain 6, 9, 32, 51
Lawrence Carpenter 13, 80
Douglas Chang 13, 74
Alice Chapman 13, 73
Daniel Chertow 7, 36
Sekai Chideya 12, 69
Adam Cohen 11, 65
Romulo Colindres 18, 95
Laura Conklin 16, 91
Deidre Crocker 6, 31
Kristin Cummings 8, 45

D
Shona Dalal 8, 47
Anand Date 16, 86
Thu-Ha Dinh 6, 34
Sucheta Doshi 10, 56

E
Judith Eisenberg 8, 47
James Eliades 13, 74

F
Sherry Farr 11, 62
Thomas Finkbeiner 17, 93
Luca Flamigni 13, 75
Fatu Forna 12, 70

G
Nicholas Gaffga 16, 90
Kate Gaynor 13, 77
Mark Gershman 15, 85
Tista Ghosh 11, 64
Brant Goode 17, 94
Hannah Gould 8, 46
Gavin Grant 12, 69
Juliana Grant 9, 54
Sharon Greene 16, 91
Diane Gross 16, 87
Sundeep Gupta 14, 82

H
Clinton Haley 16, 88
Zsakeba Henderson 9, 53
Michele Hlavsa 9, 50
Dina Hooshyar 9, 53
Angela Huang 12, 68

J
Krishna Jafa 17, 92
Seema Jain 7, 38
Lyn James 7, 41
Michael Jhung 10, 15, 57, 83
Hannah Jordan 12, 70

K
Mark Katz 12, 71
Neely Kazerouni 7, 39
Andrea Kim 17, 93
Kathy Kudish 13, 75

L
Karen Lee 16, 89
Mysheika Lemaile-Williams 7, 41
Felicia Lewis 18, 94
Heather Lindstrom 6, 35
Suchita Lorick 13, 79
Richard Luce 16, 89

M
Mark Malek 8, 44
Meredith McMorrow 11, 63
Elizabeth Melius 13, 16, 76, 86
Manoj Menon 7, 39
Eric Miller 8, 48
Gita Mirchandani 8, 45

N
Alexandra Newman 11, 62
Trang Nguyen 10, 55
Ryan Novak 18, 95

O
Rosalyn O'Loughlin 8, 44
Ciara O'Reilly 7, 36

P
Amy Parker 6, 33
Ami Patel 7, 42
Roopal Patel 12, 68
Boris Pavlin 15, 84
Eric Pevzner 9, 52
Christina Phares 11, 63
Rachel Plotinsky 13, 76

R
Araceli Rey 7, 16, 40, 90
Avid Reza 12, 71
Margaret Riggs 10, 59
Sara Russell 8, 16, 43, 88

S
Sukhminder Sandhu 9, 49
Joshua Schaffzin 6, 31
Ann Schmitz 16, 92
Sarita Shah 9, 52
Andrea Sharma 11, 61
Tom Shimabukuro 13, 79
Carrie Shuler 11, 13, 64, 78
Jonathan Siekmann 11, 66
Jacek Skarbinski 12, 72
Lynn Sosa 18, 96
Eric Stern 8, 43
Masja Straetemans 11, 61
Parmi Suchdev 9, 50
Rebecca Sunenshine 7, 42
Stephen Swanson 13, 15, 77, 84

T
Carolyn Tabak 8, 48
SangWoo Tak 11, 60
Esther Tan 7, 37
Min Tao 9, 49
Nato Tarkhashvili 12, 67
Benjamin Tsoi 13, 18, 78, 96

U
Kristin Uhde 12, 67

V
David Van Sickle 10, 57
Andrew Voetsch 7, 37

W
Su Wang 10, 56
Mary Anne Wenck 7, 38
Arthur Wendel 8, 46
Christine West 10, 58

Y
Emad Yanni 10, 58
Fuyuen Yip 10, 11, 59, 60
Jean Yuan 10, 15, 55, 85

Z
Lauren Zapata 11, 65

Centers for Disease Control and Prevention
www.cdc.gov