Monday, March 31, 2003
Session A
8:30-10:15a
Dynamic Diversity — A Spectrum of EIS Investigations
Moderator: Julie L. Gerberding

Transmission of West Nile Virus from an Organ Donor to Four Transplant Recipients — Georgia and Florida, 2002
8:35am

Authors: ***Martha Iwamoto, MD, MPH, D. Jernigan, S. Zaki, R. Lanciotti, A. Guasch, M. Trepka, C. Blackmore, W. Hellinger, S. Pham, S. Lance-Parker, C. Diaz Granados, A. Winquist, C. Perlino, S. Wiersma, K. Hillyer, J. Goodman, A. Marfin, M. Chamberland, L. Petersen, and West Nile in Transplant Recipients Team***

Background: West Nile virus (WNV) infections in the United States have increased dramatically in number since first recognized in 1999. WNV transmission through organs or blood has not been reported previously. In August 2002, organ recipients from a common donor developed fever and encephalopathy; transmission of WNV through organ transplantation was suspected.
Methods: We reviewed medical records, conducted interviews, and collected blood and tissue samples from the organ donor and recipients. Samples were tested for WNV by quantitative PCR, IgM antibody enzyme immunoassay, viral isolation attempts, and immunohistochemical (IHC) staining. Persons who donated blood to the organ donor and associated co-components were identified and tested for WNV nucleic acid and IgM antibody.
Results: We identified WNV infection in the organ donor and all four organ recipients: three developed encephalitis, one developed febrile illness. Live virus was isolated from organ donor specimens obtained at organ recovery. Three organ recipients seroconverted with WNV IgM antibody; one recipient had brain tissue positive for WNV nucleic acid, virus by isolation, and WNV antigen by IHC. The organ donor received blood transfusions from 63 donors. Follow-up testing of 57 blood donors identified one donor who developed WNV IgM antibody in the 2 months following blood donation; this donor did not have detectable viremia at blood donation.
Conclusions: This cluster represents the first recognized transmission of WNV by organ transplantation. Blood transfusion may have been the source of organ donor viremia. As the incidence of WNV infection increases, the possibility of transmission from organs and blood presents a growing challenge. Our findings have contributed to FDA's announced intention to recommend donor screening for WNV once suitable assays are available.

Key words: West Nile virus, organ transplantation, blood transfusion, encephalitis, infectious disease, organ procurement

Lung Disease Risk in Microwave Popcorn Production Workers — Iowa, 2002
8:55am

Authors: ***Richard S. Kanwal, MD, MPH, P. Schleiff, P. Enright, K. Fedan, K. Kreiss***

Background: Workers in microwave popcorn and flavoring manufacturing plants have developed severe fixed obstructive lung disease from inhalation of concentrated flavoring vapors. The management of a popcorn plant (193 employees) requested an evaluation after a flavoring-exposed worker was affected despite the use of ventilation and respiratory protection to control exposures.
Methods: Interviewers administered a questionnaire to collect information on workers' symptoms, respiratory diagnoses, respirator use, and smoking status. Technicians tested workers' lung function with spirometry. Findings in microwave popcorn production workers were compared to findings in other workers at the plant, and to data from the Third National Health and Nutrition Examination Survey. Industrial hygienists performed air sampling to measure concentrations of flavoring chemicals.
Results: No statistically significant excesses of symptoms or reported respiratory illness existed in 87 microwave popcorn production workers compared to 70 workers in other plant areas. The prevalence of spirometry abnormalities in microwave popcorn production workers did not differ significantly from expected. However, having worked as a mixer of flavorings with oil was significantly associated with abnormal spirometry (odds ratio 6.5, 95% confidence interval=1.9-22.4) when compared to non-mixers after adjusting for smoking status. Mixers reported infrequent respirator use for job tasks where respirators were required. Average air concentrations of flavoring chemicals were low compared to levels at a different plant where many workers had been affected.
Conclusions: Mixers are still at risk for lung disease from short-term peak exposures to flavoring vapors even when ventilation maintains low average exposures. These workers should use respirators at all times during exposure to flavoring vapors and should be followed in a spirometry surveillance program until hazardous flavoring exposures are eliminated.

Key words: obstructive lung disease, occupational diseases, occupational exposure, inhalation exposure, flavoring agents, butter, diacetyl

Counting the Cost of 20 Years of War: Surveillance for Injuries from Landmines and Unexploded Ordnance — Afghanistan, 2001-2002

9:15am

Authors: ***Oleg O. Bilukha, MD, PhD, M. Brennan, B. Woodruff***

Background: Afghanistan is one of the countries worldwide most affected by landmines and unexploded ordnance (UXO). Landmines/UXO injure or kill at least 1,200 Afghans per year and may undermine postconflict recovery. Approximately two million returning refugees in 2002 may be at high risk for injury because they are unaware of newly dangerous areas. Despite ongoing surveillance for landmine/UXO injuries, the data have been insufficiently used to target mine risk education (MRE) activities.
Methods: The International Committee of the Red Cross operates active and passive clinic-based surveillance for landmine/UXO injuries, which includes 390 (about 90% of all existing) health clinics and hospitals in Afghanistan. Surveillance data were used to describe victim demographics, risk behaviors, circumstances and explosive types related to landmine/UXO incidents.
Results: Of the 1637 victims during March 2001 - June 2002, 81.2% were civilians, and 51.4% were under 18 years of age. Ten times more injuries occurred in males than in females, and children aged 10-14 years were at highest risk. Children and adolescents were 2.4 times more likely to be injured by UXO rather than landmines as compared with adults (95% CI=2.1-2.8). The most prominent risk behaviors were playing and tending animals among children and adolescents, and military activity among adults. The case-fatality ratio of 9.4% is probably underestimated because surveillance detects predominantly victims who survive long enough to receive medical care.
Conclusions: Because males and adolescents are at highest risk, MRE should specifically target these groups. In addition, MRE should focus on UXO hazards to children and adolescents and on landmine hazards to adults, and should address age-specific risk behaviors. Expansion of community-based reporting will improve sensitivity and representativeness of surveillance.

Key words: landmine, unexploded ordnance, risk behavior, victim

Prevalence of Overweight Among School Children Using a Statewide Physical Fitness Testing Program — Los Angeles County, California, 2001

9:35am

Authors: ***Nolan E. Lee, MD, MPH and P. Simon***

Background: National studies have documented an epidemic increase in overweight among children in the United States. However, few studies have assessed overweight in local child populations. California state legislation requires public schools to report annual physical fitness testing results on all children in grades 5, 7, and 9. We used data from the California Physical Fitness Testing Program (CPFTP) to measure prevalence of overweight among children in Los Angeles County (LAC) public schools.
Methods: We analyzed CPFTP data on body mass index (BMI), calculated from height and weight measurements on LAC children tested in spring 2001. We defined *overweight* as BMI ≥95th percentile and *at risk for overweight* as BMI ≥85th and <95th percentile, using CDC sex-specific growth charts.
Results: A total of 354,370 LAC students were tested, representing 89.1% of enrolled students. Of these, 281,630 (79.5%) had sufficient data reported to be included in the analysis. Overall, prevalence of overweight and at risk for overweight was 20.6% and 18.7%, respectively. Prevalence of overweight was higher among boys (23.7%) than girls (17.4%). Latinos had the highest prevalence of overweight (25.2%), followed by Pacific Islanders (20.0%), blacks (19.4%), whites (13.0%), and Asians (11.9%). Prevalence of overweight was inversely related to grade level (24.6% among 5th graders, 19.9% among 7th graders, and 15.7% among 9th graders), and varied widely across the 80 school districts in the county (range: 5.1%-37.1%).
Conclusions: Prevalence of overweight among LAC public school children far exceeds the *Healthy People 2010* target of 5%, and is highest among Latino children. The CPFTP may be a useful population-based surveillance tool for tracking overweight in local child populations and guiding public health action.

Key words: obesity, child, adolescent, body mass index, prevalence, Los Angeles

Reducing Racial Disparities in Pneumococcal Disease with a New Childhood Vaccine — United States, 1998-2001

9:55am

Authors: ***Brendan L. Flannery, PhD, MPH, S. Schrag, M. Farley, J. Hadler, L. Harrison, N. Bennett, R. Lynfield, A. Reingold, P. Cieslak, R. Facklam, E. Zell, C. Whitney***

Background: Eliminating health disparities between racial groups is a national public health priority. Historically, incidence of disease caused by *Streptococcus pneumoniae*, a leading cause of bacteremia, meningitis, and pneumonia, has been higher among black children than among whites. In early 2000, a vaccine covering seven pneumococcal serotypes was licensed for use in children. We examined whether vaccine introduction has reduced racial disparities in pneumococcal disease.
Methods: Invasive disease was defined as isolation of *S. pneumoniae* from a normally sterile site. We determined rates of invasive disease from population-based surveillance at seven Active Bacterial Core Surveillance/Emerging Infections Program Network (ABCs) sites having a population of 715,382 white and 212,820 black children <5 years of age. We contrasted rates in 2001, the first complete year of vaccination, with 1998-1999 averages using Poisson regression.
Results: In 2001, pneumococcal disease rates for children <5 were 59% lower than 1998-1999 averages. Incidence fell 61% among black children, from 222.3 to 86.9/100,000 ($p<0.001$) and 53% among white children, from 68.0 to 32.0/100,000 ($p<0.001$). The difference between rates for blacks and whites was reduced by 64% from 154.3 to 54.9/100,000, although the rate ratio comparing incidence among blacks and whites decreased only slightly, from 3.3 to 2.7 ($p=0.12$). Reductions in disease attributable to vaccine-included serotypes accounted for 97% of the decrease among white children and 90% among blacks.
Conclusions: Introduction of pneumococcal conjugate vaccine was associated with significant declines in disease rates among children and a narrower gap between rates for black and white children. Although vaccine may not eliminate the higher risk of disease among blacks, ensuring high vaccine coverage will help to further reduce disease incidence in all racial groups.

Key words: *Streptococcus pneumoniae*, pneumococcal vaccine, children, racial disparities

Monday Session B
10:45a-12:15p
Family History and Racial/Ethnic Disparities in Chronic Diseases
Moderator: Suzanne M. Smith

Family History and Cardiovascular Disease Risk-Reducing Behaviors — United States, 2001

10:50am

Authors: ***Margaret E. McCusker, MD, MS, P. Yoon, M. Khoury, A. Malarcher, L. Neff, M. Gwinn***

Background: First-degree relatives of persons with cardiovascular disease (CVD) have an elevated risk for developing CVD compared with the general population. We studied the association between knowledge of family CVD history and behaviors to reduce CVD risk in adults without known CVD.
Methods: Healthstyles is a national survey of health attitudes and behaviors. During 2001, this self-administered questionnaire was mailed to a nonprobability sample of 5,605 U.S. adults. We used age-stratified Mantel-Haenszel odds ratios (OR) to compare prevalence of CVD risk-reducing behaviors among adults without known CVD, based on number of first-degree relatives (mother, father, sister or brother) reported to have CVD. We classified respondents' CVD risk as average (no first-degree relatives with CVD), moderate (one relative) or high ($\geq$ two relatives).
Results: Sixty-six percent of people surveyed returned questionnaires, of whom 3,377 had no known CVD. Of these, 28% and 15% were classified as at moderate and high risk, respectively. Moderate-risk respondents were more likely to report eating fewer high-fat foods (OR 1.22, 95% Confidence Interval [CI] 1.03-1.45) to reduce CVD risk than average-risk respondents. Moderate- and high-risk respondents were more likely to report having serum cholesterol measured within the past five years (OR 1.43, 95% CI 1.21-1.69 and 1.26, 95% CI 1.01-1.56, respectively), and taking aspirin to reduce CVD risk (OR 1.28, 95% CI 1.08-1.52 and 1.47, 95% CI 1.19-1.81, respectively) than average-risk respondents.
Conclusions: Almost half of respondents reported a family CVD history. Persons with one or more first-degree relatives with CVD are more likely to practice certain CVD risk-reducing behaviors. Family history might be an important public health tool to identify individuals at increased CVD risk and target prevention messages.

Key words: cardiovascular diseases, family, behavior, risk factors, genetics

Racial and Ethnic Disparities Among Stroke Survivors — United States, 2000

11:10am

Authors: ***Henraya F. Davis, PhD, A. Malarcher, T. Antoine, K. Greenlund, J. Croft***

Background: Stroke is the third leading cause of death and a major cause of disability in the United States. African Americans are far more likely than whites or Hispanics to die of stroke. However, little information is available on racial and ethnic differences in co-morbidities or stroke risk factors among stroke survivors.
Methods: We used the 2000 National Health Interview Survey, a nationally representative household survey of the noninstitutionalized U.S. population, to estimate the prevalence of hypertension, coronary heart disease (CHD), myocardial infarction (MI), and diabetes among 738 African-American, white, and Hispanic adults. We also estimated the prevalence of stroke risk factors including current smoking, no leisure time physical activity (sedentary), overweight, and binge drinking. Comparisons were assessed by the chi-square statistic using SUDAAN.
Results: Among stroke survivors, 68.0% had hypertension, 26.3% had CHD, 25.3% had MI, and 26.3% had diabetes. African Americans were significantly more likely than whites ($p<0.05$) to have hypertension (85.9% vs. 64.0%), CHD (85.9% vs. 63.9%) or diabetes (41.0% vs. 23.4%). Co-morbidities did not differ among Hispanics and whites. Overall, 65.6% of stroke survivors were sedentary, African Americans (81.3%) moreso than whites (62.7%) ($p<0.05$). Other risk factors varied little by race/ethnicity; 63% of stroke survivors were overweight, 19.7% smoked, and 6% were binge drinkers.
Conclusions: U.S. stroke survivors have a high prevalence of co-morbidities and stroke risk factors. Renewed efforts to prevent and control hypertension are particularly needed among African-American stroke survivors if the *Healthy People 2010* goals of reducing stroke mortality and eliminating disparities are to be achieved.

Key words: stroke, cerebrovascular disorders, disparities, race/ethnicity

Adipose Tissue Fatty Acids and Atherosclerosis in Alaska Natives and Nonnatives — Alaska, 1989-1993

11:30am

Authors: ***Joseph B. McLaughlin, MD, MPH, G. Malcom, D. Boudreau, W. Newman, S. Parry, J. Middaugh***

Background: Atherosclerosis is the leading cause of death and disability in the United States; however, atherosclerosis-associated mortality rates are 33% lower among Alaska Natives (AN) than Alaska nonnatives. To help test the hypothesis that these differences are due to less atherosclerosis and increased available omega-3 fatty acids (O3FA) from marine foods, we performed an autopsy study comparing atherosclerotic raised lesions (ARL) and stored adipose tissue fatty acid concentrations between AN and nonnatives.
Methods: Arterial, adipose tissue, and serum specimens were collected from a convenience sample of 130 AN and 115 nonnatives during autopsy between February 1989 and December 1993. Three pathologists experienced in visual grading independently quantitated arterial ARL; consensus was the average of the three grades. Fatty acid composition of adipose tissue samples was determined by gas-liquid chromatography (GLC).
Results: Age-controlled analyses revealed significant differences in ARL between AN and nonnatives in all vessels (14.7% vs. 31.2%, $p <0.001$). Age-controlled analyses of GLC results revealed higher total O3FA concentrations in AN compared with nonnatives (1.21% vs. 0.97%, p-value <0.001). Fatty acids 16_1 and 20_1, indicative of a seafood diet, were found in higher concentrations in AN than nonnatives (5.16% vs. 4.26% and 0.9% vs. 0.68%, respectively; $p <0.001$ for both). The differences in ARL remained significant ($p <0.001$) in multivariate analyses controlling for known atherosclerosis risk factors including sex, cholesterol level, smoking status, body mass index, hypertension, and glycosylated hemoglobin level.
Conclusions: This study lends support to theories that O3FA from marine foods are protective against the development of atherosclerosis by demonstrating greater concentrations of available O3FA and fatty acids associated with a seafood diet coupled with significantly less atherosclerosis in AN than nonnatives.

Key words: atherosclerosis, omega-3, fatty acid, Alaska Native, seafood

Differences by Race in Treatment of Prostate Cancer Among Males — Washington, D.C., 1996–2001

11:50am

Authors: ***Peter E. Thomas, PhD, MPH, V. Kofie, J.O. Davies-Cole***

Background: Prostate cancer is the second most common cause of cancer death for U.S. men, but the best course of treatment is unclear. Although 80% of diagnosed cases are among men aged ≥ 65 years, fewer than 10% die within 5 years after diagnosis. Yet, in Washington, D.C., the prostate cancer mortality rate for blacks is more than twice that for whites. This study addresses whether this racial disparity can be attributed to differences in treatment.
Methods: Using data from the Washington, D.C. National Program for Cancer Registries database, we identified 2,810 newly diagnosed prostate cancer cases for 1996–2001. We conducted bivariate analysis and logistic regression to examine the association between race and treatment strategies.
Results: The mean age at diagnosis of prostate cancer was similar for the 1,891 black and 506 white patients (68.5 years versus 68.9 years). Similar proportions of blacks and whites were diagnosed with localized cancer (82.3% versus 83.5%), but blacks were more likely to present with distant cancer (7.1% versus 3.1%). Among blacks, 31% received no treatment, 26% received surgery, 15% radiation, and 9% hormone therapy. Among whites, only 19% received no treatment, 40% received surgery, 18% radiation, and 3% hormone therapy. After controlling for age and stage of cancer, black patients were significantly more likely to have no reported treatment (odds ratio = 1.8; 95% confidence interval = 1.4, 2.3).
Conclusions: In Washington, D.C., treatment of prostate cancer differs by race. Additional analyses, (e.g. survival analysis that considers sociodemographic effects) must be conducted to assess the impact of these findings and to elucidate other factors contributing to the prostate mortality racial gap.

Key words: prostate cancer, epidemiologic factor, blacks

Monday Meet the Authors Poster Session 12:30-1:30p

Behavior and Health

Poster No. 1 Binge Drinking Among Adults — United States, 1999 and 2001

Authors: ***Jacqueline W. Miller, MD, R. Brewer, T. Naimi***

Background: Binge drinking causes approximately half of the estimated 100,000 alcohol-related deaths in the United States each year. The Behavioral Risk Factor Surveillance System (BRFSS), a telephone survey, and the National Household Survey on Drug Abuse (NHSDA), an in-person survey, provide population-based estimates of binge drinking. Understanding how binge drinking rates differ across these surveys is important for surveillance and for planning prevention programs.
Methods: We derived national and state estimates of binge drinking (defined as five or more drinks on one occasion) from the BRFSS and the NHSDA for 1999 and 2001 combined. We used Pearson's correlation coefficient test, *t*-test, and chi-square test for statistical analysis.
Results: National binge drinking estimates were 14.7% (95% confidence interval [CI]=14.5-14.9) for the BRFSS versus 21.6% (CI=21.1-22.0) for the NHSDA. This 7% difference persisted when stratified by sex, race, age, and education. Although there was good correlation between state-specific estimates of binge drinking (correlation coefficient=0.82, $p<0.0005$), BRFSS state binge drinking estimates were significantly lower ($p<0.05$) than the NHSDA estimates in 48 states. The wording of the binge drinking question and the demographic characteristics of binge drinkers were similar in the two surveys. However, the NHSDA includes a reliability check within the interview program that prompts respondents to resolve any inconsistencies in reporting of alcohol use.
Conclusions: Binge drinking estimates were significantly lower in the BRFSS than in the NHSDA. It is unlikely that these differences are due to respondent demographics or wording of the question. These differences are more likely due to survey methodology.

Key words: alcohol drinking, drinking behavior, surveillance, health survey

Poster No. 2
Does Transferring Juveniles to Adult Courts in the United States Reduce Rates of Violent Crime?

Authors: ***Angela K. McGowan, JD, MPH, R. Hahn, A. Liberman, P. Briss***

Background: In the 1990s, responding to increases in serious juvenile crime, including violent crime, 47 states and D.C. strengthened their laws to prosecute more juveniles as adults. We performed a systematic review of published studies to assess the public health impact of these measures on subsequent violent crime among juveniles who have been prosecuted as adults and in the overall juvenile population.
Methods: We followed the methods of the *Guide to Community Preventive Services* to search for evidence, evaluate the design and execution of qualified studies, extract results, transform results to a common scale, and summarize the evidence based on the number of studies, their quality of design and execution, and effect sizes and consistency. Crime was measured by arrest rates.
Results: We found eight qualified studies. Five assessed the effect of transfer of juveniles to adult courts on violent crime rearrest rates among these juveniles. All five studies were of greatest design suitability; two were of good and three of fair execution. Treating juveniles as adults was associated with increased relative risks of rearrest relative to treating them as juveniles [RRs 1.13 to 2.00 (median = 1.59)]. Three studies compared rates of arrest for violent crimes in regions with strong transfer laws with rates in regions without. These studies were of greatest and moderate design suitability and fair execution. They showed inconsistent results.
Conclusions: States changed their laws with the expectation of decreasing violent juvenile crime. Available evidence indicates that transferring juveniles to the adult court system increases rather than decreases rates of violence among those transferred, and shows inconsistent effects on levels of violent crime in the overall juvenile population.

Key words: violence, legislation & jurisprudence, juvenile delinquency, criminal law

Toxic Exposures

Poster No. 3
Swim at Your Own Risk: Toxic Exposure Associated with an Indoor Swimming Pool — West Virginia, 2002

Authors: ***Susan C. Kaydos-Daniels, PhD, MSPH, T. Shwe, R. Nambiar, A. Burnett, R. Akhtar, D. Bixler***

Background: Chlorination is the standard method used to disinfect swimming pools. Ammonia, introduced into pools through human waste, combines with free chlorine to produce chloramines. Health effects of swimming pool chloramine exposure are not well-defined. We investigated an illness outbreak indicative of chloramine exposure among persons using a hotel's indoor pool.
Methods: A case was defined as any hotel guest/visitor on October 5–6, 2002, who experienced ≥3 symptoms typical of chloramine exposure on either day after visiting the hotel. We performed an environmental assessment and cohort study to determine the association between pool exposure and illness.
Results: Of 128 persons interviewed, 32 met the case definition (25% attack rate). Case-patients most commonly reported cough (84%), burning eyes (78%), and rash (34%). Median symptom duration was 3 days. Illness was associated with swimming (risk ratio [RR] = 5.9; 95% Confidence interval [CI] = 2.90–12.1), but more strongly with entering the pool area (RR = 25.7; 95% CI = 3.60–182.5). A strong dose-response relationship existed between illness and duration in the pool area and duration of swimming (both, $p < 0.001$). Pool chloramine levels measured on October 6 were ≥0.7 ppm (optimal level = 0 ppm; state maximum = 0.5 ppm). The pool operator lacked formal training in pool maintenance. Maintenance records were not kept for 11 days before the outbreak.
Conclusions: High chloramine levels may have caused illness in persons who were either in or near the pool. Ventilation systems might not adequately replace air around an indoor swimming pool. This outbreak underscores the need for regular pool maintenance. Education and certification should be required for all operators of public and semipublic pools.

Key words: chloramines, swimming pools, ventilation, disease outbreaks

Poster No. 4
Pulmonary Health Effects Among Hockey Players Exposed to Ice Resurfacer Emissions — Whitehall, Pennsylvania, 2002

Authors: *Carlos A. Sanchez, MD, J. Melk, A. Stock, C. Brown, J. Mott*

Background: The public health impact of carbon monoxide and nitrogen dioxide exposure in indoor ice arenas is well documented. Still, not all states have guidelines regulating ice-resurfacing machine exhaust emissions. The CDC assisted the State of Pennsylvania in an epidemiologic investigation of an incident occurring at a single ice rink to identify risk factors for respiratory and pulmonary illness among amateur hockey players.
Methods: We conducted phone interviews to investigate risk factors. A probable case was defined as any hockey player present at the ice rink on 09/29/2002 who reported two or more respiratory symptoms during the game. A confirmed case was a probable case who reported hemoptysis. A NIOSH investigation team undertook environmental sampling and evaluation.
Results: Interviews indicated that 21 of 44 players (48%) were probable cases and 9 (20%) were confirmed cases. Regression analysis indicated that neither confirmed nor probable case status was significantly associated with the amount of time spent on the ice. Probable (OR=28.5; 95%CI=5.59-145.44), and confirmed (OR=14.54; 95%CI=1.65-128.41) cases were significantly more likely to have used the locker room immediately adjacent to the heater room, where the ice resurfacer was parked, and those who spent over 90 minutes inside the locker room were more likely to develop hemoptysis (OR=6.88; 95%CI=0.93-50.78). This association was independent of asthma status. The NIOSH evaluation documented a gap in the ventilation system that extracted air from the heater room into the adjacent locker room.
Conclusions: Hockey players are not only at risk of exhaust exposure while on the ice surface, but also in the locker rooms. Air quality monitoring in closed ice arenas should include rooms potentially exposed to emissions from the ice-resurfacing machine.

Key words: carbon monoxide, nitrogen dioxide, hockey, vehicle emissions

Poster No. 5
Improper Chemical Mixing — 16 States, 1996-2001

Authors: *Kirsten P. Ernst, MSN, MPH, BSN, S. Rossiter, W. Kaye*

Background: Although chemical spills are most frequently thought to be associated with industry, improper chemical mixing events occur in a wide variety of settings including private households, day-care centers, schools, and nursing/personal care facilities.
Methods: Data from ATSDR's Hazardous Substances Emergency Events Surveillance system were used to conduct a retrospective analysis on the public health consequences from improper chemical mixing in 16 states during 1996 through 2001.
Results: Although <1% of all events (328/39,766) were associated with improper mixing, they were 5.5 times more likely to result in victims (44% vs. 8%) and 6 times more likely to involve evacuation (52% vs. 9%). Similar to all events, improper mixing events affected a wide range of individuals with 22% either less than 18 years of age or more than 65 years of age. While only 5% of all events occurred within personal and professional service industries, 24% of mixing events occurred in these industries. Three types of releases were more common with improper mixing than with all events: air emission (45% vs. 39%), fire (15% vs.4%) and explosion (6% vs. <1%). The primary injury reported in improper mixing events as well as in all events was respiratory system irritation (54%). Most victims (69% improper mixing, 54% overall) were transported to and treated at the hospital, but not admitted. Chlorine was the chemical most frequently involved in improper mixing (12%) while ammonia was the most frequently involved overall (6%).
Conclusions: Improper chemical mixing events occur within home, childcare, and healthcare settings and may involve common cleaning agents. Education to promote proper use, handling, storage, and disposal of these chemicals will reduce improper mixing events and prevent injuries.

Key words: hazardous materials, hazardous chemicals, hazardous substances, households, schools, healthcare

Respiratory Diseases

Poster No. 6
Coccidioidomycosis (Valley Fever) — Arizona, 1998-2002: Are Large Seasonal Outbreaks Predictable?

Authors: ***Benjamin J. Park, MD, K. Sigel, T. Clark, M. Phelan, T. Colman, K. Komatsu, V. Vaz, C. McRill, A. Comrie, R. Hajjeh***

Background: Recently, coccidioidomycosis incidence in Arizona increased substantially, from 15/100,000 population in 1995 to 43/100,000 in 2001. We conducted an investigation to identify factors responsible for the increase.
Methods: We analyzed NETSS surveillance data and the Arizona Hospital Discharge Database from 1998 to 2002. Geographic Information Systems (GIS) was used to map cases and potential environmental factors such as construction activities. We performed Poisson regression to assess climatic and environmental factors on disease incidence. A model including these factors was developed and tested to predict outbreaks.
Results: Although all age groups were affected, the highest incidence occurred in persons >65 years old (79/ 100,000 in 2001). Coccidioidomycosis hospitalizations increased over eightfold during the study period—from 69 (1998) to 598 (2001). Analysis of NETSS data by season indicated incidence peaks during the winter (November- February), a new finding in Arizona. A particularly large outbreak occurred during the 2001-2002 winter, with 1,442 total cases reported compared to an average of 714 cases in the previous three winter seasons. GIS mapping of Maricopa County cases by zip code showed the highest incidence in areas of high construction activities. Predictions from a model incorporating rainfall history for seven months, recent temperatures, and dust concentrations—factors significantly ($p<0.05$) associated with disease incidence—reasonably correlated with the outbreaks, particularly the large outbreak beginning winter 2001(R-squared= 0.75).
Conclusions: The coccidioidomycosis epidemic in Arizona has caused significant morbidity, especially among the elderly. It is driven by seasonal outbreaks that are associated with environmental and climatic changes. Our study may help public health officials in Arizona predict seasonal outbreaks, allowing them to alert the public and physicians early, and recommend appropriate preventive measures.

Key words: coccidioidomycosis, outbreak, Arizona, climate, seasonal, predictive model

Poster No. 7
Pertussis Outbreak Exaggerated by Direct Fluorescent Antibody Testing — Idaho, 2002

Authors: ***Kris K. Carter, DVM, MPVM, ACVPM, C. Becker, M. Wilkin, V. Hevern, T. Hosch-Hebdon, L. Tengelsen, C. Hahn***

Background: Pertussis, a highly communicable, potentially fatal respiratory disease, is difficult to diagnose. Because direct fluorescent antibody (DFA) tests for pertussis are problematic, CDC does not recommend them. During September 20 through December 12, 2002, 85 confirmed or probable cases of pertussis in Blaine County, Idaho were reported in contrast to five cases from 1997 through 2001. We examined the consequences of using a commercial monoclonal DFA test during the outbreak.
Methods: Nasopharyngeal swabs from 397 Blaine County area residents were submitted by health-care providers. Swabs were tested for pertussis by culture, monoclonal DFA, and the polymerase chain reaction (PCR) test. Confirmed cases met the CDC clinical case definition and were PCR-positive or epidemiologically linked to a PCR-positive case. Probable cases met the CDC clinical case definition. Estimates of hours of outbreak-associated labor by health department staff were obtained.
Results: Onset dates in case-patients ranged from July 1 to November 4, 2002. Median case-patient age was 16 years (range 0.75 - 62 yrs); 51% were female. Of all swabs submitted, no cultures were positive for *Bordetella pertussis*, thirty-five (13.2%) of 265 PCR tests were positive, 132 (33.3%) of 396 DFA tests were positive, and 16(12.9%) of 124 DFA-positive samples were PCR-positive. Test agreement among 233 samples on which DFA and PCR results were available was no better than expected by chance (kappa=–0.04). The outbreak consumed over 1200 hours of labor. Eleven (85%) of 13 state laboratories contacted use DFA testing for pertussis.
Conclusions: False-positive results from monoclonal DFA testing exaggerated the pertussis outbreak and led to a substantial public health department workload. Diagnostic laboratories should reconsider DFA testing of nasopharyngeal secretions for pertussis.

Key words: whooping cough, *Bordetella pertussis*, disease outbreaks, diagnosis, fluorescent antibody technique, direct, murine monoclonal antibody BL-5

Poster No. 8
Human Metapneumovirus Infection in Children Hospitalized with Acute Respiratory Illness – United States, 2000-2001

Authors: ***James A. Mullins, DVM, MPH, D. Erdman, G. Weinberg, K. Edwards, C. Hall, F. Walker, M. Iwane, L. Anderson***

Background: Human metapneumovirus (hMPV) is a recently discovered respiratory pathogen of the family *Paramyxoviridae* and the same subfamily as respiratory syncytial virus (RSV). Studies in other countries have associated hMPV infection in children with respiratory disease of similar severity as RSV infection. The objective of this study was to describe the clinical and epidemiologic features of hMPV infections in children in the United States.
Methods: We collected specimens from August 2000 to September 2001 from the National Immunization Program New Vaccine Surveillance Network, a population-based, prospective study of acute respiratory illness among inpatient children <5 years old in Rochester NY and Nashville TN. Specimens were tested for hMPV, RSV, influenza, and parainfluenza viruses by reverse transcription-polymerase chain reaction (RT-PCR) assays and GeneScan™ deoxyribonucleic acid fragment analysis of PCR products. We abstracted epidemiologic data from medical charts and conducted admission interviews with parents.
Results: Of 675 specimens tested, 26 (3.8%) were positive for hMPV, 123 (18.2%) for RSV, 41 (6.1%) for parainfluenza 1, 2, or 3, and 22 (3.3%) for influenza. hMPV-positive children were significantly older than hMPV-negative children (median age 11.5 months and 6 months, respectively p=.02) and were more likely to come from the Rochester site (risk ratio=1.5, p=.03). Fifteen percent of hMPV-positive children required intensive care, and 52% received supplemental oxygen, similar to RSV-positive children. Discharge diagnoses for hMPV-positive children included asthma (7), bronchiolitis (7), pneumonia (7), and croup (2).
Conclusions: Among children hospitalized with respiratory illness, the incidence of hMPV infection was similar to that of influenza and parainfluenza but less than RSV. Clinical disease severity, however, mirrored that of RSV infection. Further investigations to better characterize hMPV infection and its clinical impact are needed.

Key words: respiratory tract infections, paramyxoviridae, inpatients, prospective studies, child

Poster No. 9
Bronchiolitis-Associated Outpatient Visits (1999-2000) and Hospitalizations (1996-2000) Among American Indian/Alaska Native and U.S. Children — United States

Authors: ***Angela J. Peck, MD, R. Holman, A. Curns, J. Bresee, J. Cheek, R. Singleton, J. Lingappa***

Background: Respiratory syncytial virus (RSV) is the leading cause of childhood viral lower respiratory infections, accounting for 50% to 80% of bronchiolitis. American Indian/Alaska Native (AI/AN) children have higher rates of RSV- and bronchiolitis-associated hospitalization than the general population of US children, but this study describes the first estimates of outpatient bronchiolitis-associated visits in these populations. These data provide a more complete assessment of bronchiolitis burden, important for public health decision-making regarding preventive strategies.
Methods: Outpatient visits and hospitalizations with bronchiolitis (ICD-9-CM code 466.1) as a diagnosis were selected for children 0-59 months of age. Data were obtained from the Indian Health Service (IHS) for AI/AN children receiving IHS-funded health care and from the National Ambulatory Medical Care Survey, National Hospital Ambulatory Medical Care Survey, and National Hospital Discharge Survey for the general US population of children.
Results: For 1999-2000, the average annual rate for bronchiolitis outpatient visits was 453.5/1000 AI/AN infants (0-11 months), three times greater than for US infants (146.2/1000), and 45.3/1000 AI/AN children (12-59 months), almost four times greater than for US children (11.8/1000). During 1996-2000, AI/AN children had higher rates of bronchiolitis-associated hospitalization than US children (75.8 vs. 39.1/1000 infants, respectively; 4.7 vs. 2.4/1000 12-59 month-old children, respectively). Outpatient and hospitalization rates were highest for the Alaska and Southwest IHS/tribal regions. Hospitalization rates for these regions increased significantly from 1990 to 2000, as did overall rates for US children.
Conclusions: Bronchiolitis-associated outpatient and hospitalization rates were higher for AI/AN children than for US children. Hospitalization rates increased over time for both populations. Increasing burden of bronchiolitis, particularly among the high-risk AI/AN population, emphasizes the need for strategies to prevent RSV-associated bronchiolitis.

Key words: bronchiolitis, respiratory syncytial virus, American Indian/Alaska Native, outpatients, hospitalization

Poster No. 10
Changes in Knowledge, Beliefs, and Decisions Among Primary Care Clinicians Regarding Antibiotic Use for Upper Respiratory Infections — Wisconsin versus Minnesota, 1999-2002

Authors: ***Karen M. Kiang, MD, E. Belongia, K. Como-Sabetti, B. Kieke, R. Lynfield, R. Besser***

Background: Respiratory infections account for >70% of antibiotics prescribed in the United States, with 30%-60% of prescriptions being inappropriate. Inappropriate use for respiratory illnesses contributed to substantial increases in antimicrobial resistance during the 1990s, compromising treatment of bacterial infections. Wisconsin initiated a multifaceted educational campaign targeting clinicians and the public in 1999 to promote judicious antibiotic use; its effect on clinicians is now being evaluated.
Methods: In 1999, a questionnaire was mailed to randomly selected primary care clinicians in Wisconsin (n=400) and Minnesota (n=400) to assess knowledge, beliefs, and decisions regarding antibiotic use for respiratory infections. In 2002, the same questionnaire was mailed to 600 Wisconsin and 400 Minnesota clinicians after implementation of the campaign in Wisconsin. Clinicians were asked the percentage of patients requesting antibiotics, and clinical case-scenario questions using Likert-scale responses (strongly disagree to strongly agree). The nonparametric Jonckheere-Terpstra (JT) test was used for data analysis.
Results: Response rates ranged from 63% to 70% among years and states. Wisconsin clinicians reported a significant decrease in the proportion of adult patients requesting antibiotics (median 1999: 50% versus 2002: 30%, JT $p<0.001$); the decrease reported by Minnesota clinicians was not significant (medians: 40% versus 30%, JT $p=0.152$). Among Wisconsin clinicians, 64.2% responded correctly to both case-scenario questions regarding respiratory illnesses in 2002 versus 42.7% in 1999 (21.5% absolute change; 95% CI=11.7%-31.2%). The proportion of Minnesota clinicians responding correctly to both increased to 58.9% from 45.8% (13.1% absolute change; 95% CI=2.4%-23.8%).
Conclusions: Although both states improved, decision making on clinical case-scenarios and perceptions of patient antibiotic demand improved more among Wisconsin clinicians, suggesting that modest benefits are attributable to Wisconsin's statewide educational campaign.

Key words: judicious antibiotic use, antibiotic resistance, prescribing practices, intervention, campaign

Poster No. 11
Adverse Events from Daily Rifampin and Pyrazinamide Treatment for Latent Tuberculosis Infection Among Inmates — New York, 2000–2001

Authors: ***Stephanie S. Noviello, MD, MPH, C. Kearns, E. Foster, L. Klopf, L. Wright, M. Oxtoby***

Background: Recommendations for treatment of latent tuberculosis infection with short-course rifampin and pyrazinamide (RIF/PZA) were published in 2000, but recent case reports of serious adverse events raised questions about the safety of this regimen. We conducted a retrospective cohort study of inmates who began receiving RIF/PZA in the New York State Department of Corrections to assess for adverse events.
Methods: We reviewed medical charts of inmates receiving RIF/PZA during 2000–2001. Demographics, history of bloodborne diseases, dosing regimens, liver chemistries and adverse events were evaluated.
Results: Four hundred ninety-seven inmates began RIF/PZA therapy; 470 charts were available for review. Of these, 435 (93%) inmates were male; median age was 33 years. One hundred seven (23%) inmates discontinued therapy because of miscount of doses (n=38), adverse events (n=31), provider preference (n=26), parole (n=7), refusal (n=3), and unknown reasons (n=2). Of 31 (6.7%) inmates who discontinued therapy because of an adverse event, 12 (39%) had asymptomatic hepatotoxicity with alanine aminotransferase (ALT) levels >5 times normal, 8 (26%) had symptoms including rash, abdominal pain, malaise, nausea, vomiting, jaundice, anorexia or dark urine, and 11 (35%) had both. White inmates were 2.4 times more likely than nonwhite inmates to discontinue therapy because of adverse events (95% confidence interval=1.1–5.5). Risk factors, including age, hepatitis C history, HIV status, PZA dose >20 mg/kg, previous isoniazid therapy, or elevated baseline ALT levels, were not significantly associated with discontinuation because of adverse events.
Conclusion: Over 75% of inmates completed RIF/PZA therapy. Previous hepatic injury was not associated with adverse events requiring discontinuation of therapy. Our results suggest that RIF/PZA with monitoring is appropriate for certain populations at risk for active tuberculosis disease.

Key words: tuberculosis, rifampin, pyrazinamide, inmates

Foodborne Infections

Poster No. 12
Outbreak of Gastrointestinal Illness Due to Norovirus Aboard a Cruise Ship — United States, 2002

Authors: ***Wairimu Chege, MD, MPH, J. Varma, C. Stover, J. Ames, E. Cramer, M.A. Widdowson, S. Beard, S. Monroe, E. Mintz***

Background: The cruise industry has been challenged by recurrent, large outbreaks of gastrointestinal illness caused by noroviruses. Sources of infection have been unclear, and control and prevention efforts difficult. In October 2002, we investigated an outbreak on cruise ship B.
Methods: We defined a case as a passenger with ≥3 loose stools in 24 hours, or vomiting with one additional symptom. We surveyed all passengers on exposures to food, water, on-ship and on-shore activities, and ill passengers. We conducted a case-control study comparing exposures between well passengers and index case-patients in cabins. We tested stool specimens from ill persons for norovirus. We investigated environmental risk factors for illness. Surveillance was conducted on subsequent cruises.
Results: Despite early institution of control measures, the outbreak continued throughout the cruise affecting 399 of 1038 passengers (attack rate [AR]=38%). Of 111 case-patients analyzed, 67 (60%) shared a dining table with an ill person, compared to 81 (48%) of 168 controls (Odds Ratio [OR]=1.6, 95% Confidence Interval [CI]=1.0-2.7). Nineteen percent of case-patients vs. 7% of controls witnessed someone vomiting (OR=3.2, CI=1.3-7.8). All 12 stool specimens yielded norovirus, genetically indistinguishable from a July 2002 outbreak strain involving the same cruise line. Environmental inspection revealed no significant deficiencies. Outbreaks of similar gastroenteritis cases (n=267) were reported on the next three voyages (AR= 3%, 13% and 5%); none have occurred since the ship was removed from service and aggressively cleaned.
Conclusions: Spread of norovirus occurs efficiently on cruise ships, likely due to person-to-person transmission. The outbreak was halted after prolonged aggressive disinfection, which is costly and disruptive. To avoid recurrent outbreaks, further investigations of environmental reservoirs and alternate control measures are needed.

Key words: Norwalk-like-virus, gastroenteritis, disease outbreaks, diarrhea, travel

Poster No. 13
Reassessment of Kaplan's Criteria in Identifying Foodborne Norovirus Outbreaks — United States, 1998-2000

Authors: ***Reina M. Turcios, MD, A. Sulka, M.A. Widdowson***

Background: Noroviruses are the most common cause of foodborne gastroenteritis outbreaks. Until recently, their laboratory confirmation has been difficult. To retrospectively attribute non-bacterial gastroenteritis outbreaks to noroviruses, Kaplan's criteria were formulated in 1982 by profiling 38 laboratory-confirmed norovirus outbreaks. Criteria include vomiting in ≥50% of patients, mean illness duration of 12-60 hours, and mean incubation period of 24-48 hours. The criteria are also loosely applied to determine specimen collection and testing strategies during outbreaks. We re-examine the validity of Kaplan's criteria.
Methods: Fit of Kaplan's criteria was tested on data from foodborne gastroenteritis outbreaks of laboratory-confirmed bacterial and norovirus etiology reported to CDC from 1998 through 2000. Sensitivity, specificity, and predictive value positive (PVP), assuming 30% norovirus disease prevalence, were calculated for Kaplan's criteria combined and separately.
Results: Of 3,957 outbreaks reported, all 268 norovirus-confirmed and all 697 bacteria-confirmed outbreaks were analyzed. When outbreaks with all clinical information available were analyzed, Kaplan's criteria fit 85 of 128 confirmed norovirus outbreaks (sensitivity 66.4%), but did not fit 207 of 211 confirmed bacteria outbreaks (specificity 98.1%); PVP was 93.9%. For the three criteria, sensitivity, specificity, and PVP, respectively, were calculated as follows: 87.3%, 56.9%, 46.5% for vomiting; 86.1%, 65.2%, 51.4% for illness duration; and 86.6%, 67.9%, 53.6% for incubation period.
Conclusions: Outbreaks fitting all Kaplan's criteria are most likely norovirus-associated; however, norovirus etiology should not be discarded if all the criteria do not fit. Similarly, bacterial etiology should not be discarded on the basis of individual criterion. With more available norovirus diagnostics, specimen collection and parallel testing for noroviruses and bacteria is recommended for all outbreaks not fitting Kaplan's criteria, or with incomplete information on any criterion.

Key words: noroviruses, Norwalk-like viruses, disease outbreaks, gastroenteritis, epidemiology

Poster No. 14
High-Level Gentamicin Resistance Among Enterococci Isolated from Outpatient Human Stools and from Meat Purchased from Grocery Stores — United States, 1998-2001

Authors: ***Katrina Kretsinger, MD, A. Drake, K. Gay, K. Joyce, K. Lewis, F. Angulo, EIP Enterococci Working Group***

Background: Enterococci are an important cause of hospital infections. High-level gentamicin resistance (HLGR) can complicate treatment, especially among patients with heart valve infections. In the United States, gentamicin is used in certain food animals, particularly chickens, turkeys and pigs, but is not frequently used in cattle. To examine the prevalence of HLGR among enterococci from food, we cultured isolates obtained from meat and poultry purchased from grocery stores and compared these data to isolates obtained from outpatient human stools.
Methods: Laboratories in five states cultured enterococci on media containing gentamicin at concentrations of 100ug/ml. Isolates were forwarded to CDC for species identification and confirmatory antimicrobial susceptibility testing using continuous gradient concentration strips. Using these methods, HLGR was defined as minimum inhibitory concentration (MIC) of gentamicin ≥500 ug/ml. We analyzed isolates of enterococci submitted between 1998 and 2001.
Results: Enterococci with HLGR were cultured from 72% (295/407) of chicken samples, 24% (143/596) of pork samples, and 4% (7/162) of beef samples (all p values by pairwise comparison <0.001). HLGR enterococci were cultured from 2% (39/1899) of human outpatient stool samples.
Conclusions: HLGR was most common among enterococci isolated from chicken, less so from pork samples, and rare among isolates from beef. HLGR enterococci were also present in human stools. Such resistance may complicate the treatment of serious enterococcal infection. Additional studies are needed to further evaluate the reasons for the very high prevalence of HLGR in enterococci from chicken samples and the relationship between isolates from animals and those from humans.

Key words: *Enterococcus*, antimicrobial resistance, gentamicin, human, chicken

Poster No. 15
Investigation of Fatal Degenerative Neurological Illnesses in Men Who Participated in Wild Game Feasts — Wisconsin, 2002

Authors: ***Vincent P. Hsu, MD, MPH, J. Davis, J. Kazmierczak, R. Wierzba, P. Gambetti, R. Maddox, L. Schonberger, E. Belay***

Background: Creutzfeldt-Jakob disease (CJD) is a fatal human disorder classified as a transmissible spongiform encephalopathy (TSE). The unexpected transmissions in Europe of a bovine TSE to humans has led to concerns that some CJD might be caused by consumption of products from cervids with the TSE called chronic wasting disease (CWD). After media reports alleged that CJD might have been the cause of death in three men who participated in common wild game feasts, we investigated to determine if an association existed between consumption of CWD-infected venison and the development of CJD.
Methods: We interviewed individuals identified as participating in wild game feasts since 1976 to obtain information about feast and hunting activities and to obtain individual medical histories. We interviewed families and reviewed medical records of the three deceased case-patients and requested central nervous system tissue from autopsy specimens for confirmatory prion testing.
Results: Information was obtained for 45 (85%) of 53 possible feast participants, 34 of whom consumed wild game at these feasts. Seven, including the three index patients, were deceased. Five hunted outside of Wisconsin but not in areas known to be endemic for CWD. None of the 34, other than the three case-patients, had any degenerative neurologic symptoms. Two of the three case-patients were diagnosed with CJD at death; re-examination of brain tissue from autopsy of the three patients confirmed that only one had evidence of TSE, a typical sporadic type CJD.
Conclusion: No evidence exists to link participation in the wild game feasts with the development of CJD. Ongoing surveillance of CJD, particularly in states with CWD, will remain important for continuing to assess the risk, if any, of CWD transmission to humans.

Key words: Creutzfeldt-Jakob disease, prion diseases, chronic wasting disease

Monday Session C
1:30-3:00p
It Hurts to Work - Occupational Illness and Injury
Moderator: Kathleen Kreiss

Summer Work and Injury Among Middle School Students Aged 10-14 Years — Wisconsin, 2001
1:35pm

Authors: ***Kristina M. Zierold, PhD, MS, S. Garman, H. Anderson***

Background: The National Institute for Occupational Safety and Health has reported that approximately 200,000 adolescents suffer work-related injuries each year and another 70 die from their injuries. Limited information exists on working middle school children aged 10-14 years. We evaluated employment and injury among Wisconsin working youth.
Methods: A cross-sectional anonymous survey was administered to middle school students in five school districts and one large urban school in September 2001. The survey consisted of questions regarding work and work-related injury during the summer months.
Results: Of the 6,182 students in the participating classes, 5,499 completed the survey; 35 were excluded because of inappropriate responses. Of the 5,464 surveys included in the analysis, 58% (n=3189) of the students reported working during the summer months. The majority of working students worked less than 10 hours per week (62%) and worked before 9 p.m. (64%). Although males were more likely than females to work ≥40 hours per week (6.1% vs. 4.2%, p = 0.034), females were more likely to work after 9 p.m. (20% vs. 14%, p <0.001). Overall, 18% of students reported being injured at work. Males were more likely to be injured than females (22% vs. 15%, p <0.001). The most common causes of injury for both sexes included slips, trips and falls from flat surfaces, contact with knives or sharp objects, and falling objects. Overall, 41% of middle school students claimed that they received safety training before starting their jobs, 22% received a safety manual, and 50% were informed of their legal rights as employees.
Conclusions: Middle school children are working and being injured on the job. Safety training and education are needed to prevent children from being injured at work.

Key words: injury, work, youth, employment

Rubella Outbreak on a Cruise Ship — Florida, 2002
1:55pm

Authors: ***David Fermin Arguello, II, MD, L. Zimmerman, B. Inman, A. Drew, R. Barwick, T. DeMarcus, D. Sharp, D. Kim, J. Icenogle, E. Abernathy, B. Tynan, S. Wiersma, S. Reef***

Background: Rubella, usually a mild rash illness, can cause miscarriage, fetal deaths, or congenital rubella syndrome when acquired early in pregnancy. After outbreaks on two cruise ships in 1997, CDC recommended that cruise lines vaccinate their crew members against rubella. This recommendation was not widely implemented. In August 2002, a cruise ship reported rubella among its crew. An investigation team boarded the ship to determine the source and extent of the outbreak and implement control measures.
Methods: Cases were identified clinically and through contact investigation. Cases and their contacts were interviewed and specimens obtained. Sera were tested for rubella antibodies, and molecular typing was performed on throat or urine specimens. Daily active surveillance of crew members was implemented by administering questionnaires inquiring about symptoms. Demographic characteristics of crew members were determined by reviewing the ship's manifests for the outbreak period.
Results: During July 14 - September 4, rubella was confirmed in five of the 1,352 crew members; 1,248 (92%) were foreign-born. All patients were foreign-born males; three with rash illness, one with mild cold-like symptoms, and one with no symptoms. Molecular typing revealed the virus sequence matched a strain from the Philippines. Molecular and epidemiologic findings suggest the outbreak source was a crew member who boarded the ship after acquiring rubella in the Philippines.
Conclusions: A susceptible population (i.e., foreign-born crew) enabled the introduction of rubella to a cruise ship. Because rubella is endemic globally, and more than 90% of crew members were foreign-born, the cruise line agreed to vaccinate all susceptible crew members against rubella. CDC recommendations for vaccination of crew members should be implemented throughout the cruise line industry to prevent future outbreaks.

Key words: rubella, rubella virus, German measles, ships, disease outbreak

Lung Disease in a Large Water-Damaged Office Building — Hartford, Connecticut, 2001

2:15pm

Authors: ***Kenneth Hilsbos, MD, J. Cox-Ganser, S. White, R. Jones, C. Rao, K. Kreiss***

Background: A union requested evaluation of a 20-story office building with a history of obvious longstanding and ongoing water damage. Workers reported building-related respiratory symptoms, asthma, hypersensitivity pneumonitis and sarcoidosis. The association between asthma and residential dampness has been established, but the mechanism remains unclear. According to published estimates, indoor work environment improvements, such as controlling moisture and mold, could save hundreds of millions of dollars annually by decreasing morbidity from building-related respiratory disease.
Methods: We invited all building occupants to complete a questionnaire about diagnoses, symptoms, and potential risk factors. We calculated prevalence ratios (PRs) based on results from the Behavioral Risk Factor Surveillance System (BRFSS 2000), the National Health and Nutrition Examination Survey (NHANES III), and a national survey of occupants of 41 office buildings without known indoor air complaints, controlling for smoking and age.
Results: Of 1304 building occupants, 889 (68%) participated. Among participants, 12.4% reported current asthma, compared with 7.8% of Connecticut adults (BRFSS; PR=1.6; 95% confidence interval [CI]=1.3-1.9). During the preceding twelve months, 35.2% reported wheezing, compared with 17.5% of U.S. working age adults (NHANES, PR=2.0, CI=1.8-2.3). Compared with non-problem buildings, 4-week PRs for work-related symptoms were 2.8 for wheezing (CI=2.2-3.6), 4.6 for chest tightness (CI=3.8-5.6) and 4.5 for shortness of breath (CI=3.6-5.6).
Conclusions: There is excess reported respiratory disease in this water-damaged office building. We made recommendations to remove affected workers from water-damaged areas, correct moisture sources, replace water-damaged materials and conduct medical surveillance. We are conducting further studies, including medical tests and a search for hazard markers, such as culturable fungi, ergosterol, specific allergens, and fine and ultrafine particle counts.

Key words: asthma, extrinsic allergic alveolitis, pulmonary sarcoidosis, indoor air pollution, occupational diseases

Cumulative Incidence of Chronic Beryllium Disease in a Ceramics Factory Cohort

2:35pm

Authors: ***Margaret K. Herrick, MD, MPH, P. Henneberger, D. Deubner, C. Schuler, E. McCanlies, K. Kreiss***

Background: Beryllium, a metal widely used in the aerospace, nuclear, ceramics, and telecommunications industries, can cause sensitization and chronic beryllium disease (CBD) through occupational exposure. We identified 136 beryllium workers first screened for sensitization in 1992 with the beryllium lymphocyte proliferation test (BeLPT). At that time, eight (5.9%) of 136 were found to be sensitized, of whom six (4.4%) had developed CBD. We followed this cohort through 2002 to determine its cumulative incidence of disease.
Methods: We attempted to determine current health status for each of the 136 workers. Sensitization was defined as a confirmed abnormal BeLPT, and CBD as lung granulomas on transbronchial biopsy in a sensitized worker. Individual work histories allowed classification by work process. Cumulative incidences of sensitization and disease were calculated.
Results: Follow-up status was determined for 115 (85%) of the cohort. By 2002, 24 (17.6%) of the 136 workers were known to be sensitized, of whom 17 (12.5%) had developed CBD; thus 71% of the sensitized developed CBD. Of those with a negative BeLPT in 1992, 16 (12.5%) of 128 were known to be sensitized and 11 (8.6%) had developed CBD. Preliminary results indicate increased risk of sensitization and CBD in those who ever worked in machining jobs.
Conclusions: The cumulative burden of sensitization and disease in this cohort is about three times greater than that found in the 1992 cross-sectional study. Because disease status of 21 former workers remains unknown, our findings may be an underestimate. Continued surveillance with the BeLPT, followed by clinical evaluation of sensitized individuals, will be critical to understanding the full burden of disease in this cohort and in establishing surveillance policy within this industry.

Key words: beryllium, berylliosis, occupational diseases, occupational medicine

Monday Session D
3:15-5:00p
Get the Point — Injection-Associated Outbreaks
Moderator: Stephen P. Luby

A Large Hepatitis B Virus Outbreak Associated with Frequent Injections at a Physician's Office — New York City, New York, 2001
3:20pm

Authors: ***Taraz Samandari, MD, PhD, N. Malakmadze, S. Balter, M. Khristova, L. Swetnam, K. Bornschlegel, M. Phillips, O. Nainan, J. Perz, I. Williams***

Background: In the United States, recognition of health-care—related HBV transmission is uncommon, but the frequency of occurrence is uncertain. In late 2001, two elderly patients, hospitalized with acute hepatitis B, were noted to have visited a common physician's (Dr. A) office during their incubation period.
Methods: We obtained HBV serologic test results in 222 of Dr. A's patients and all five office staff. Cases were patients with serologic evidence of acute HBV infection during 2000-2001 who had visited Dr. A's office during the incubation period. To identify risk factors, we interviewed case-patients and conducted a retrospective cohort study. Three regions of HBV DNA (comprising 45% of the genome) were sequenced.
Results: Thirty-eight cases and four chronic infections were identified. Office staff were not infected. Among 18 cases and 73 susceptible patients included in the cohort study, the attack rate was 27% for those receiving ≥ one injection and 0% for those receiving no injections (relative risk 13.6, 95% confidence interval [CI] 2.4-undefined). Compared with patients receiving 0-2 injections, the infection risk 5.2-fold (CI 0.6, 47.3) and 20.0-fold (CI 2.8, 143.5) higher among those receiving 3-5 injections and ≥ 6 injections, respectively. HBV DNA sequences were identical from all 24 cases and four chronically infected patients tested. All office staff administered multiple injections that were not medically indicated, using practices that increased the risk for blood contamination of injection equipment and multi-dose vials.
Conclusions: A single HBV strain was transmitted among patients in an outpatient practice, associated with injection overuse and unsafe practices. Better characterization of bloodborne pathogen transmission risk and measures to improve and monitor infection control practices in the outpatient setting are warranted.

Key words: hepatitis B virus, disease outbreak, injection safety, multi-dose vials

Health-Care–Related Transmission of Hepatitis B and C Viruses — Oklahoma, 2002
3:40pm

Authors: ***Rae Dawn Comstock, PhD, T. Vogt, P. Scott, J. Fox, S. Mallonee, J. Perz, B. Bell, R. Moolenaar, M. Crutcher***

Background: Chronic viral hepatitis is the leading cause of chronic liver disease in the United States; health-care–related transmission of multiple viral types is rarely reported. In August 2002, we investigated six unexplained HCV infections among patients of an Oklahoma pain management clinic.
Methods: To determine the outbreak's magnitude and etiology, we performed a seroprevalence survey, chart abstraction, and interviews among patients seen since the clinic opened in 1999. Case-patients were defined as persons with confirmed positive HCV antibody or HBV total core antibody tests. Newly diagnosed infections were considered clinic-acquired among case-patients consecutively treated for pain.
Results: Testing was performed on 750 (89.5%) of 838 clinic patients; 82 HCV and 51 HBV infections were identified. Clustering of cases occurred on 12 clinic days including one with 11 HCV-positive patients treated sequentially and one with four HBV-positive patients closely following a chronically infected patient. Hepatitis history was reported by 8 HCV and 11 HBV case-patients; 43 HCV and 9 HBV infections were considered clinic-acquired. The source of infection for remaining cases was uncertain. Among clinic-acquired cases, the mean number of visits was higher than among seronegative patients (2.1 versus 1.5, $p < 0.001$). A nurse anesthetist admitted routinely reusing needles/syringes to administer medication through heparin-locks of multiple patients. The incidence of clinic-acquired HCV infection was higher before (18.6%) versus after (0.0%) discontinuation of this practice in June 2002 (risk difference = 18.6, $p < 0.001$).
Conclusions: This appears to be the first documented U.S. health-care – related outbreak of both HCV and HBV infection associated with reuse of needles/syringes. Aggressive training and monitoring of appropriate infection control practices in health-care facilities is necessary.

Key words: hepatitis C virus, hepatitis B virus, health-care—related, outbreak, anesthetist, heparin-lock

Outbreak of *Mycobacterium abscessus* Soft Tissue Infections Following Cosmetic Injections — New York City, New York, 2002

4:00pm

Authors: ***Reina M. Turcios, MD, M. Yakrus, R. Cooksey, B. Lash, L. Adams, C. Driver, C. Kambili, S. Munsiff, E. Whitney, D. Ashford***

Background: *Mycobacterium abscessus*, a ubiquitous, rapidly growing mycobacterium, rarely causes human illness. In June 2002, report of four women with *M. abscessus* soft tissue infections following cosmetic injections in New York City (NYC) indicated an outbreak requiring investigation.
Methods: NYC physicians and laboratories were alerted, and asked to report patients with atypical soft tissue infections following cosmetic procedures since January 1, 2002. Patients were interviewed; available medical records reviewed. Confirmed cases were patients with soft tissue infections, history of cosmetic injections, and an *M. abscessus* isolate; suspected cases lacked the isolate. Available isolates were typed, and compared by two molecular typing methods.
Results: Twelve confirmed and 13 suspected cases were identified; 21 were women; median age was 46 years (range 21-65); and 84% of Hispanic ethnicity. 20 reported injections with non-FDA-approved substances imported from Venezuela between April and June 2002. Injections were applied to face (N=11), buttocks (N=10), and other sites (N=19). Approximate incubation periods ranged from 2-80 days; median delay to treatment was 15 days (range 2-57). Two unlicensed cosmetic injections providers working together associated with 23 cases were identified. The eleven isolates available fell into one of two different groups by both molecular typing methods. All six group 2 patients received silicone injections. Reports of additional cases abroad are being investigated.
Conclusions: The investigation led to the arrest of two providers for illegally practicing medicine. The illegal nature of injections hindered diagnosis, case reporting, and epidemiologic linking of patients; molecular typing was valuable in confirming epidemiologic links. The source of suspected product contamination remains unknown. When diagnosing atypical soft tissue infections, medical providers should consider non-tuberculous mycobacterial etiology, and inquire about non-medical injections.

Key words: atypical mycobacterium infections, soft tissue infections, disease outbreaks

Health-Care–Related Transmission of Hepatitis C Virus at an Oncology Clinic — Nebraska, 2000-2001

4:20pm

Authors: ***Alexandre Macedo de Oliveira, MD, MSc, K. White, D. Leschinsky, T. Vogt, J. Perz, R. Moolenaar, T. Safranek***

Background: Hepatitis C virus (HCV) infection results in end-stage liver disease in 10%-20% of cases. Health-care—related HCV transmission can occur when standard infection-control practices are not followed. We investigated a report of HCV infections among patients at a Nebraska oncology clinic to determine the outbreak source.
Methods: We recruited all living patients seen at the clinic during March 2000-December 2001. We collected clinical and risk factor information through chart abstractions and patient interviews, and reviewed infection-control practices. A case was defined as laboratory-confirmed HCV infection in a clinic patient without previous HCV infection. The date of infection onset was approximated by the first date on which an alanine aminotransferase level >3 times the upper limit of normal was recorded.
Results: Of 613 clinic patients, 486 (79.3%) underwent serologic testing. Eighty-two (16.9%) case-patients were identified, all of whose first clinic visit occurred before July 2001. HCV genotype 3a was present in all 78 samples genotyped. Date of onset information was available for 54 (65.9%) case-patients. The mean number of venous infusions performed during March 2000-June 2001 was greater among these case-patients than among HCV-negative patients (12.2 versus 1.9, $p < 0.001$). One patient with prior HCV infection of genotype 3a began treatment in March 2000 and was the probable source patient. Staff reported that syringes used to draw blood from patients were routinely reused to draw catheter-flushing solution from shared saline bags. This procedure was corrected in June 2001.
Conclusion: Reuse of syringes, leading to contamination of shared saline bags, appears to be the cause of this large health-care—related HCV outbreak. Health-care facilities should maintain strict oversight of standard infection-control practices.

Key words: hepatitis C virus, healthcare, outbreak, infection control

Outbreak of Joint and Soft-Tissue Infections Associated with Injections from a Multiple-Dose Medication Vial — Tennessee, 2001

4:40pm

Authors: ***David L. Kirschke, MD, T. Jones, C. Stratton, J. Barnett, W. Schaffner***

Background: Corticosteroid injections are common outpatient procedures, but use of multiple-dose medication vials (MDVs) presents an infection-control dilemma. We investigated an outbreak of infections after injections by a physician.
Methods: A retrospective cohort analysis was performed. A case was defined as a joint or soft-tissue infection after an injection by the physician during August 2001. Isolates were compared by using pulsed-field gel electrophoresis (PFGE). In vitro persistence of the outbreak strain in MDVs of lidocaine was investigated.
Results: The physician performed intra-articular or soft-tissue corticosteroid injections on 17 patients during August, and 5 (29%) patients were subsequently hospitalized for infections at the injection site. One patient died of complications related to sepsis. Isolates of penicillin-sensitive *Staphylococcus aureus* from four patients were indistinguishable by PFGE. Of 17 patients receiving injections, 10 (59%) were injected with a combination of lidocaine and triamcinolone; 7 (41%) were injected with triamcinolone only. All five case-patients received injections containing lidocaine ($p = 0.04$). The physician used MDVs of lidocaine and single-dose vials of triamcinolone. The MDV of lidocaine used during the outbreak was unavailable. A contributing factor might have been refrigeration after use of MDVs of lidocaine; the manufacturer recommends storage at room temperature. The in vitro study demonstrated that all MDVs of lidocaine maintained at room temperature met requirements for antimicrobial effectiveness compared with none at refrigerator temperature ($p<0.01$), which had persistence of bacteria for >28 days.
Conclusions: A single MDV of lidocaine likely was inoculated with *S. aureus* and improperly stored, resulting in infectious complications. This outbreak highlights the need for strict attention to aseptic procedures and the importance of following the manufacturers' instructions for safe storage of MDVs.

Key words: injections, cross-infections, *Staphylococcus aureus*, infection control

Tuesday, April 1, 2003
Concurrent Session E1
8:30-10:15a
Dangerous Dining — Foodborne & Diarrheal Diseases
Moderators: Paul S. Mead & Susan Lance-Parker

Large Outbreak of Salmonellosis Among Transplant Recipients: A Rapid Web-Based Investigation — Florida, 2002

8:35am

Authors: ***Padmini Srikantiah, MD, D. Bodager, B. Toth, T. Kass-Hout, R. Hammond, S. Stenzel, R.M. Hoekstra, J.K. Adams, S. Van Duyne, P.S. Mead***

Background: Salmonellosis causes approximately 1.4 million illnesses annually among Americans, and can cause life-threatening infection in immunocompromised hosts. In July 2002, CDC was notified of two *Salmonella* Javiana infections among attendees of the U.S. Transplant Games, a 4-day athletic competition among 1500 organ and bone marrow transplant recipient athletes held at a Florida theme park.
Methods: To determine the source of the outbreak, we conducted a case-control study among Transplant Games participants. Using specially designed software (eQuest), we created a web-based questionnaire to rapidly survey 1,100 Transplant Games attendees with known email addresses. We defined a case as fever or diarrhea with onset between June 25 and July 7. Controls were well survey recipients. Respondents' answers were automatically stored in a secure electronic database.
Results: A total of 369 (34%) persons responded to the survey; of these, 296 (80%) responded within 48 hours. Eighty-two persons (22%) from 32 states reported illness; 48 (59%) were transplant recipients. Among ill respondents, 41 (53%) were female, and the median age was 47 years (range: 4-71 years). Symptoms included diarrhea (93%) and fever (51%). Ill persons were significantly more likely to report eating dishes containing pre-diced tomatoes (adjusted odds ratio = 4.3; 95% confidence interval = 2.1-9.1). Traceback investigation revealed that the theme park received Plant X diced tomatoes. Microbiologic evaluation of Plant X diced tomatoes indicated fecal coliform contamination.
Conclusions: Using web-based technology, we successfully determined the source of this outbreak, and provided timely information to a geographically dispersed, high-risk patient population. Our experience highlights the increasing importance of web-based tools in epidemiologic investigations, and signals the need to further develop such methods for use in public health.

Key words: *Salmonella*, web-based, immunocompromised, transplant, tomatoes

Outbreaks of Norovirus Gastroenteritis Associated with Wedding Cakes — Massachusetts, 2002

8:55am

Authors: ***Dara Spatz-Friedman, PhD, MPH, D. Heisey-Grove, J. Nsubuga, F. Argyros, J. Fontana, T. Stiles, R. Dicker, S. Monroe, R. Beard, E. Harvey, P. Kludt, B. Matyas, A. DeMaria, Jr.***

Background: The burden of Norovirus infections in the United States is estimated to be 23 million cases of gastrointestinal illness per year, of which 9.2 million are foodborne. Outbreaks of Norovirus-compatible illness occurred among guests of weddings serving cake provided by the same local bakery during the weekend of April 26, 2002. This bakery provided cakes for 46 weddings that weekend.
Methods: To determine the cause of disease, ill attendees from the earliest reported weddings and all bakery employees were tested for Norovirus. To determine whether wedding cake was the vehicle for infection, we inspected the bakery and conducted cohort studies among wedding attendees. A case-patient was defined as any person from the 46 weddings who experienced onset of vomiting, diarrhea, nausea, or abdominal cramps within three days of the event.
Results: Molecularly indistinguishable Norovirus was detected in stool submitted by 3 of 8 wedding attendees from two different weddings and 1 of 14 bakery employees. This bakery employee and another bakery employee with illness compatible with Norovirus infection became ill during preparation of the wedding cakes. Norovirus-compatible illness was experienced by 334 (36%) of 937 wedding attendees from 21 weddings participating in the study. Illness was more common among cake-eaters than non-eaters for 8 of the weddings (58% versus 12%; risk ratio = 5.1, $p < 0.0001$).
Conclusions: Cake prepared by a local bakery was the apparent vehicle for Norovirus infection among wedding attendees. One or more foodworkers at the bakery may have contaminated the wedding cakes associated with these outbreaks. These findings reinforce the necessity of excluding ill foodhandlers from work and of proper hygiene and foodhandling practices.

Key words: epidemiology, outbreaks, Norovirus, foodborne transmission

Collaborative International Investigation of an Outbreak of *Shigella sonnei* Infections Among Guests of an All-Inclusive Resort — British West Indies, 2002

9:15am

Authors: ***Dawn M. Norton, PhD, V. Duke, M. Huddle, P. Srikantiah, L. Robinson, R. Ewing, S. Hunter, K. Hutcheson, C. Bopp, Z. Abbas, S. Isaacs, B. Ciebin, S. O'Brien, J. Hospedales, S. Luby***

Background: An estimated 10,000,000 international travelers develop travel-related diarrhea annually. Tour companies are increasingly held liable for traveler illness. In November 2002, the Caribbean Epidemiology Centre reported an outbreak of *Shigella sonnei* infections among guests of an all-inclusive resort in the British West Indies. We conducted an investigation to determine the extent, source, and appropriate control measures for this outbreak.
Methods: We initiated case surveillance, conducted a retrospective cohort study among resort guests and inspected the facility. For the cohort study, ill persons were defined as resort guests who developed diarrhea (≥3 stools/24 hr). Clinical isolates were subtyped by pulsed-field gel electrophoresis (PFGE).
Results: Residents of the United States (n=25), Canada (n=40), and the United Kingdom (n=5) were among 78 cases identified. Symptom onset dates ranged from November 5-27. Stool cultures from 14 cases yielded *Shigella sonnei* that shared an indistinguishable PFGE pattern. We enrolled 23 ill and 43 well persons in the cohort study. Illness was associated with fruit juice consumption (relative risk=8.9, attack rate 47% versus 5%, 95% confidence interval=1.3–61.4). Restaurant inspection revealed inadequate juice preparation utensils that allowed employee hand contact with the juice, improper food holding temperatures, restaurant employees returning to work wearing gloves worn into the bathroom, and inadequate handwashing. The outbreak ended following implementation of a rigorous restaurant hygiene program.
Conclusions: It is likely that a food service employee who was shedding *Shigella* transmitted the organism to guests by contaminating juice during preparation. The increased liability of tour companies provides new incentives to implement standards-based quality improvements in restaurant hygiene, staff training, surveillance, and disease outbreak investigation in tourism-dependent regions. Ultimately, these actions could help prevent traveler's diarrhea.

Key words: *Shigella*, disease outbreak, travel, restaurant, international cooperation

Factors Associated with Death Among Listeriosis Patients — Nine States, July-November, 2002

9:35am

Authors: ***Elizabeth Claire Newbern, PhD, MPH, S. Gottlieb, J. Sobel, P. Griffin, C. Johnson, E. Chernak***

Background: Listeriosis is a life-threatening foodborne illness that primarily affects pregnant women, the elderly, and those with compromised immune systems. Heightened surveillance during an outbreak provided an opportunity to examine factors associated with fatal infections (excluding fetal loss).
Methods: We obtained demographic characteristics and medical histories from all patients with *Listeria monocytogenes* (LM) infection identified in nine states between July and November 2002, and then compared patients who died with those who did not in bivariate analysis.
Results: We identified 186 listeriosis patients, 39 (21%) of whom died. Twenty-eight (72%) deaths occurred among those ≥ 65 years, 10 (26%) were among persons 1–64 years old, and one (3%) was a premature infant. All deaths among those aged 1–64 years and 75% of elderly deaths were among patients with immunocompromising medical conditions. No fatalities occurred among the 11 pregnant women. Thirty-two percent of those ≥ 65 years died compared with 11% of younger patients (risk ratio (RR) =2.9, 95% confidence interval (CI) = 1.5–5.4). Among patients receiving chemotherapy, 38% died, compared with 17% of those not receiving chemotherapy (RR =2.2, 95% CI = 1.1–4.4). Fifty-six percent of patients receiving immunosuppressive therapies other than steroids died versus 16% of those not receiving immunosuppressives (RR = 3.4, 95% CI = 1.7–7.2). Fourteen percent of patients with febrile illness died compared with 34% of those without fevers (RR = 0.4, 95% CI = 0.2–0.9).
Conclusions: Among these listeriosis patients, death was more common among persons 65 years and older, those receiving certain treatments that reduce immune function, and those unable to mount fever responses. Heightened prevention efforts focused on these populations could potentially reduce the number of fatal LM infections.

Keywords: listeria infection, mortality, immunocompromised host, aged

Outbreak of *Escherichia coli* O157:H7 Infections Associated with Sprout Consumption: Possible Role of Contaminated Water — California, 2002

9:55am

Authors: ***Marc G. Romney, MD, DTM&H, J. Mohle-Boetani, M. Gutierrez, S. Abbott, J. Farrar, B. Werner***

Background: *Escherichia coli* O157:H7 infection causes substantial morbidity and sometimes death. Even limited clusters merit study for possible intervention. In August 2002, we identified five *E. coli* O157:H7 isolates with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns.
Methods: To determine a potential source, we conducted a case-control study, a trace-back investigation, and an environmental investigation. We defined a case-patient as a resident of California or neighboring state from whom *E. coli* O157:H7 was recovered during July or August 2002, and whose isolate matched the PFGE outbreak pattern. We compared case-patients with age and sex-matched controls identified by random-digit dialing.
Results: All five case-patients but only one of nine controls consumed alfalfa sprouts (odds ratio undefined; 95% confidence interval = 2.80 – ∞). All case-patients consumed alfalfa sprouts from a single sprout-growing facility. Immediately before the outbreak, debris was removed from a water storage tank at the facility, and then irrigation water from multiple sprout varieties tested positive for *E. coli* O157:H7. These positive results were not reported to public health authorities. Proper procedures to decontaminate seed and prevent cross-contamination were not followed.
Conclusions: Contaminated seeds have caused prior sprout-associated outbreaks. Because irrigation water from multiple sprout varieties tested positive and the onset of positive tests coincided with the cleaning of the water tank, contaminated water might have played a role in this outbreak.
Because of inadequate records and procedures, other sources (seed contamination and cross-contamination) cannot be excluded as possible causes. Similar outbreaks could be prevented if public health officials were alerted regarding confirmed positive production samples before the release of sprouts. Sprouts continue to be a health hazard, and irradiation of sprouts merits consideration.

Key words: disease outbreaks, food handling, *Escherichia coli* O157:H7, sprouts, irradiation

Tuesday Concurrent Session E2
8:30-10:15a
TB at Home and Abroad
Moderators: Dixie E. Snider, Jr. and Ram Koppaka

An Investigation of the Risk of Nosocomial Transmission of Tuberculosis in a Community Hospital — Guatemala City, Guatemala 2001-2002
8:35am

Authors: ***Abraham G. Miranda, MD, MSc, I. Gonzalez, E. Rodriguez, S. Chang, P. Jensen, K. Castro, T. Navin, G. Villatoro, C. Ramirez, C. Mejia, K. Laserson, K. Ijaz***

Background: In Central America, the intersection of the human immunodeficiency virus (HIV) epidemic with endemic tuberculosis (TB) makes hospital TB infection control imperative. Concern about a perceived increase in TB incidence among staff and HIV-infected patients led officials from Hospital A (HA), an 850-bed hospital in Guatemala with 45,000-50,000 admissions annually to request CDC assistance in an investigation of possible nosocomial transmission.
Methods: At HA, we reviewed the medical records of patients with acid-fast bacilli (AFB) smear-positive or clinically diagnosed active TB disease between 12/1/01 and 11/30/02, assessed hospital areas conducive to TB transmission, and surveyed the TB knowledge, attitudes, and practices of a convenience sample of health-care workers (HCW).
Results: Seventy-one patients had TB disease, 62 (87%) were hospitalized, 35 (49%) were HIV co-infected, and 14 (20%) died. Twenty-seven (43%) hospitalized patients were infectious with AFB-positive sputum smears, only 13 (48%) of whom were isolated; isolation initiation took up to 5 days (median=1 day). Twenty (74%) infectious patients spent up to 5 days (median=1 day) in the emergency department before admission. We observed deficiencies in engineering and administrative controls essential to the prevention of TB transmission including the absence of a written TB infection control plan, multiple patients with different isolation needs occupying the same room, and the lack of negative air-pressure in all isolation rooms tested. Fifteen (42%) HCW felt that ventilating an occupied isolation room to the corridor was an acceptable practice.
Conclusions: Multiple opportunities exist for nosocomial TB transmission at HA. This can be reduced with inexpensive administrative and engineering control measures including effective HCW education, and rapid identification and segregation of patients with active TB, particularly from HIV-infected patients.

Key words: tuberculosis, cross infection, Guatemala, health facility environment, HIV infections, knowledge, attitudes, practice

Nosocomial Transmission of *Mycobacterium tuberculosis* in a Large Community Hospital Associated with an HIV-Positive Patient — March-September, 2002
8:55am

Authors: ***McKenzie Andre, MD, J. Hinnant, W. Heirendt, J. Block, P. McElroy, K. Ijaz***

Background: Hospital patients and staff are at risk for nosocomial transmission of *Mycobacterium tuberculosis (M.tb)*. We investigated a hospital outbreak of tuberculosis to identify factors associated *M.tb* transmission among patients and health-care workers (HCW) following the delayed diagnosis of an infectious TB patient.
Methods: For all case-patients, we reviewed medical records and determined location and duration on the medical units. Patient-contacts, who shared time on the unit with the index case-patient, were provided a tuberculin skin test (TST). We examined risk factors for TST conversion (≥5mm with negative TST in past) by analyzing TST results and HCW staffing records. RFLP analysis was performed on all isolates.
Results: Despite continued fever and cough of at least 10 days, the source case-patient remained undiagnosed for 17 days on two medical units. Five secondary TB case-patients, who were on the units during this period, were diagnosed among patients and staff between June and September. Among all case-patients (n=6), two had AIDS and three had chronic renal disease. Of the 261 patients housed on the same units as the source patient, 152 had at least one immunocompromising condition. Of the 159 patient-contacts whose TST results were evaluated, 44 (27.6%) had a positive TST (≥5mm). Among 495 HCW-contacts, 56 (11.3%) had a TST conversion. HCWs who provided direct care to the index case-patient (21/65) were more likely to convert their TST than other staff (29/404) (RR=4.5, 95%CI=2.74,7.40). All case-patients' isolates shared an identical 6-band RFLP pattern.
Conclusions: Diagnostic delay contributed to extensive nosocomial transmission of *M.tb*. In settings where TB patients are treated, continued vigilance and timely evaluation of high-risk contacts such as immunocompromised patients or hospital staff remain crucial components of TB control.

Key words: tuberculosis, nosocomial infection, outbreak, contact tracing

High Prevalence of Drug-Resistant Tuberculosis — Republic of Lithuania, 2002

9:15am

Authors: ***Puneet K. Dewan, MD, A. Sosnovskaja, K. Laserson, P. Arguin, P. Cegielski, J. Cicenaite, V. Thomsen, E. Davidaviciene, C. Wells***

Background: Drug-resistant forms of tuberculosis (TB) are more difficult and expensive to treat than susceptible forms. European countries of the former Soviet Union have the world's highest reported levels of anti-TB drug resistance. We evaluated anti-TB drug resistance in the previously unsurveyed Republic of Lithuania.
Methods: *Mycobacterium tuberculosis* isolates from all incident culture-positive pulmonary TB (PTB) patients registered from January through October 2002 were tested for susceptibility to the first-line anti-TB drugs isoniazid, rifampin, ethambutol, and streptomycin. Multidrug resistance (MDR) was defined as resistance to at least both isoniazid and rifampin. New patients were those treated for <1 month with any anti-TB drug. A random 25% sample of MDR
isolates had further testing for resistance to pyrazinamide, kanamycin, and ofloxacin, important drugs for MDR-TB treatment.
Results: Of 549 registered PTB patients, 313 (38.8%) had isolates resistant to at least 1 first-line drug, and 103 (18.8%) had MDR-TB; 395 (71.9%) patients were new and 154 (28.1%) were previously treated. MDR-TB was found among 26 (6.6%) new patients and 77 (50%) previously treated patients. In the random sample of MDR *M. tuberculosis* isolates, resistance to pyrazinamide was found in 14 [56%, 95% confidence interval (CI) 35-75%], kanamycin in 13 [52%, 95% CI 32-72%], and ofloxacin in 5 [21%, 95% CI 7-41%].
Conclusions: The prevalence of MDR-TB in Lithuania is among the highest reported in the world. Finding MDR-TB among new patients signifies its ongoing community spread. The frequency of resistance to pyrazinamide, kanamycin, and ofloxacin suggests that existing treatment practices may be generating potentially untreatable forms of MDR-TB. To combat spread of drug-resistant TB, Lithuania is pursuing nationwide implementation of the World Health Organization global TB control strategy.

Key words: tuberculosis, multidrug-resistant, surveillance

Tuberculosis Treatment Outcome Among Ex-Prisoners — Kazakhstan, 2000

9:35am

Authors: ***Hardeep S. Sandhu, MD, MBBS, A. Dadu, P. Nsubuga, E. Maes, M. Favorov, M. White***

Background: In Kazakhstan, the TB notification rate per 100,000 population increased from 64 in 1991 to 160 in 2000. Ex-prisoners, a marginalized population, were exposed to prisons with estimated high prevalences of TB and drug-resistant strains. We studied the outcome of TB treatment among ex-prisoners in Kazakhstan.
Methods: We selected all 22,723 newly diagnosed and reported TB patients in Kazakhstan in 2000. All patients were treated according to World Health Organization (WHO) standard directly observed treatment, short-course (DOTS). Our study population was 8,550 sputum-positive TB patients with documented treatment outcomes, using standard WHO definitions. We compared the cohort of ex-prisoners (464, 5%) against all other TB patients (8,086, 95%).
Results: The mean age of ex-prisoners was 34 years (Standard Deviation [SD] 9.5 years) and 36 years (SD 14.8 years) for all other TB patients. Among ex-prisoners, 454 (98%) were males versus 4,796 (59%) of all other TB patients. Forty-nine (11%) ex-prisoners had a history of alcoholism versus 297 (4%) of all other TB patients. For ex-prisoners, treatment compliance at 2 months was unsatisfactory among 74 (16%), as compared with 830 (10%) among all other TB patients (relative risk [RR]=1.6; 95% Confidence Interval [CI]=1.3–1.9). Treatment failure was documented for 69 (15%) ex-prisoners as compared with 764 (9%) of all other TB patients (RR=1.6; 95% CI=1.3–1.9). Fewer ex-prisoners, 279 (60%) were cured versus 6,048 (75%) of all other TB patients (RR=0.8; 95% CI=0.8–0.9).
Conclusions: Ex-prisoners in Kazakhstan had poorer treatment outcomes than other TB patients. The government of Kazakhstan is now implementing the recommendations to treat ex-prisoners as a high-risk group and integrate prisons into the civilian TB-control program.

Key words: tuberculosis, ex-prisoners, treatment-outcome

Anti-Tuberculosis Drug Resistance and Anonymous HIV Surveillance Among Tuberculosis Patients — Botswana, 2002

9:55am

Authors: ***Lisa J. Nelson, MD, MPH, E. Talbot, M. Mwasekaga, M. Notha, C. Wells***

Background: HIV and drug-resistant tuberculosis (TB) both threaten TB control efforts. Surveillance for HIV and drug resistance among TB patients is recommended. In 2001, Botswana reported a TB incidence rate of 621/100,000 and an HIV seroprevalence rate of 36.2% in pregnant women. In a 1995 survey, 3.7% of new and 14.9% of retreatment TB patients had any drug resistance, while 0.2% of new and 5.8% of retreatment patients showed resistance to at least isoniazid and rifampin (multidrug-resistant (MDR) TB). The survey was repeated in 2002, including the first nationwide anonymous HIV testing of sputum specimens.
Methods: Sputa from all consecutive smear-positive new patients and all retreatment patients were included from March to November 2002 nationwide. After anonymization, one sputum per patient was tested for HIV using Oraquick® (Orasure Technologies), a rapid test designed for oral secretions. Specimens were cultured for *Mycobacterium tuberculosis* and isolates tested for resistance to isoniazid, rifampin, ethambutol, streptomycin, and pyrazinamide.
Results: Isolates from 2118 patients nationwide were included. Overall, 61.5% of isolates were HIV positive. Among 185 new and 32 retreatment patients for whom results were available to date, MDR TB was found in 0.5% (95% confidence interval [CI] 0.0, 3.0) of new patients and 12.5% (CI 4.1, 27.5) of retreatment patients. Resistance to any drug occurred in 14.6% (CI 10.0, 20.2) of new patients and 34.4% (CI 19.6, 53.2) of retreatment patients.
Conclusions: HIV is common among TB patients in Botswana. Preliminary data indicate that any drug resistance has increased significantly in Botswana since previous surveys. These data indicate the need to coordinate TB and HIV services in order to address rising drug-resistance rates.

Key words: tuberculosis, drug-resistance, HIV, surveillance

Tuesday Concurrent Session F1
10:45a-12:15p
The Wonder Years — School and Adolescent Health
Moderator: Howell A. Wechsler

Large Outbreak of *Escherichia coli* O157:H7 Infections Linked to Homemade Butter Served at a School — North Carolina, 2001

10:50am

Authors: ***Pavani Kalluri, MD, P. Jenkins, S. Sheats, B. Smith, B. Jenkins, L. Wolf, D. Briggs, J.M. Maillard, N. MacCormack, P. Mead***

Background: Escherichia coli O157:H7 is an important cause of bloody diarrhea and hemolytic uremic syndrome (HUS). In November 2001, we investigated a large outbreak of E. coli O157 infections among North Carolina school children.
Methods: We conducted a case-control study at School A to identify risk factors for illness. We defined a case as bloody diarrhea or laboratory-confirmed E. coli O157 infection with onset between November 15 and 29.
Results: We interviewed 31 patients and 71 controls at School A. The most common symptoms reported by patients were diarrhea (96.8%), cramps (90.3%), and bloody stool (83.9%). Infection with E. coli O157 was confirmed in 14 patients (45.2%). School A hosted a Native American food tasting and a homemade butter demonstration before the outbreak. Illness was associated with eating homemade butter (Odds Ratio 12.3, Confidence Interval 3.4-44.3, p<.0001), hamburger (OR 4.7, CI 1.7-12.0, p=.001) or string beans (OR 3.4, CI 1.0-11.2, p<.05). Butter consumption remained significant with stratified analysis controlling for hamburger exposure (adj OR 13, CI 3.37-50.4) and string bean exposure (adj OR 11, CI 3.0-40.9). All patients with laboratory-confirmed E. coli O157 infection reported eating butter, which was made from unpasteurized milk. Shiga toxin but no E. coli O157 was detected in manure from the butter maker's milking cows.
Conclusions: Homemade butter made from unpasteurized milk was the most likely source of E. coli O157 in this large school-associated outbreak. Microbiologic studies have confirmed the survival of E. coli O157 in butter. Although sale of unpasteurized milk is prohibited in North Carolina, non-commercial distribution is legal. Health authorities and school officials should prohibit distribution of risky foods, such as unpasteurized milk products, in schools.

Key words: E coli O157, diarrhea, butter, schools

Outbreak of Conversion Disorder Among Amish Adolescent Girls — Tennessee, 2002

11:10am

Authors: ***Joslyn D. Cassady, PhD, D. Kirschke, T. Jones, A. Craig, W. Schaffner***

Background: Conversion disorder is a psychiatric syndrome, characterized by neurologic dysfunction in the absence of underlying organic illness, causing considerable impairment. Outbreaks of conversion disorder are rarely reported. In October 2001, we initiated an investigation of a cluster of cases of unexplained neurologic illness among Amish girls in Tennessee.
Methods: A case of conversion disorder was defined as unexplained neurological symptoms including lower extremity weakness and being bedridden for more than a week in an Amish resident of County A with onset between January 2000 and February 2002. We reviewed the medical records of all case-patients, consulted with local health providers, performed active case finding, administered open-ended interviews and a structured questionnaire, and met with Amish community members.
Results: Five case-patients were identified among an Amish social cohort: all were girls aged 12-14 years, and four were the oldest child in their family. The clinical characteristics of all five patients included voluntary motor deficits, anorexia, and weight loss. Four of five patients experienced headache, abdominal pain, and neck weakness, resulting in the inability to hold up their heads. Thorough medical evaluations failed to identify an organic etiology, and evidence for social transmission of symptoms was identified. All five patients met the Diagnostic and Statistical Manual-IV criteria for conversion disorder. Social stressors were identified, including family conflicts over church standards, that preceded illness onset. Family behavioral interventions were recommended. Three months after the investigation, four of five patients showed marked improvement.
Conclusions: An outbreak of conversion disorder was likely precipitated by a crisis over church standards. This investigation demonstrates the importance of interdisciplinary approaches to identify collective episodes of psychogenic illness and develop culturally-appropriate intervention strategies.

Key words: conversion disorder, amish, qualitative methodologies

Pregnancy in Perinatally HIV-Infected Adolescents— Puerto Rico, 2002

11:30am

Authors: ***Michelle S. McConnell, MD, C. Zorrilla, I. Febo, I. Ortiz, J.C. Orengo, A. Rodriguez, J. Rullan, K. Dominguez, M.G. Fowler***

Background: The survival of perinatally HIV-infected children in the United States has increased, and many children are now living to adolescence and adulthood. As a result, some adolescents are initiating sexual activity and becoming pregnant. We describe, for the first time, the pregnancies of perinatally HIV-infected adolescents and the risk factors associated with these pregnancies.
Methods: Case subjects were pregnant or previously pregnant, perinatally HIV-infected adolescents in Puerto Rico; control subjects were age-matched, never-pregnant, perinatally HIV-infected female adolescents from the same clinics. Charts were reviewed, and interviews were conducted with all eight known case subjects and eight control subjects.
Results: Of 10 pregnancies to eight adolescents, six pregnancies resulted in live births, two in elective abortions, one in a spontaneous abortion, and one pregnancy was on-going. No cases of perinatal transmission have occurred. Median age at first pregnancy was 17 (range 13-19). Five case subjects reported unintended pregnancies, two reported having used contraception when they conceived, and six reported not having always used a condom with their first partner. More case subjects than control subjects dropped out of school before pregnancy (3 vs. 1), and more had pregnant friends before becoming pregnant themselves (5 vs. 2). The median age at learning HIV status was 13 for both groups. Median age at sexual initiation was lower for case subjects than for the two control subjects who had been sexually active (14.5 vs. 16.5).
Conclusions: As the perinatally HIV-infected population in the United States ages, increasing numbers of pregnancies of perinatally HIV-infected adolescents can be expected. The findings concerning these adolescents in Puerto Rico highlight the need to develop interventions and risk-reduction strategies for perinatally HIV-infected adolescents.

Key words: HIV, pregnancy, adolescent, safe sex

Secondhand Tobacco Smoke Exposure Among Middle and High School Students — New Hampshire, 2001

11:50am

Authors: ***Leigh T. Ramsey, PhD, MS, S. Knight, A. Pelletier***

Background: Secondhand smoke (SHS), a known carcinogen, can cause asthma and respiratory infections in youth. We examined risk factors for SHS exposure among adolescents using the New Hampshire Youth Tobacco Survey (NHYTS).
Methods: NHYTS, a self-administered survey using a two-stage cluster sample design, was conducted in public school grades 6–12 in 2001. SHS exposure was defined as being in a room or car with someone smoking during the previous 7 days. Adjusted odds ratios (AOR) were calculated using logistic regression. Population attributable risk was calculated using methods described by Fleiss for cross-sectional data.
Results: Of 2,984 completed surveys (68% response rate), 64.5% (95% confidence interval [CI] 62.1%, 66.9%) of students reported SHS exposure, ranging from 50.1% in 6th grade to 80.7% in 12th grade. SHS exposure did not differ by sex. Factors associated with SHS exposure included smoking during the previous 30 days (AOR 10.2; 95% CI 3.4, 30.8), living with a smoker (AOR 4.9; 95% CI 3.4, 7.0), having someone smoke inside the home in the previous 30 days (AOR 3.2; 95% CI 2.1,4.9), and having ≥1 close friend who smoked (AOR 2.8; 95% CI 2.1, 3.9). We estimated that 26.5% (95% CI 26.1%, 26.9%) of SHS exposure among students was attributable to living with a smoker, 19.9% (95% CI 19.6%, 20.3%) to having someone smoke inside the home in the previous 30 days, 19.4% (95% CI 19.0%, 19.7%) to having ≥1 close friend who smoked, and 9.7% (95% CI 9.5, 9.8) to smoking during the previous 30 days.
Conclusions: SHS exposure among youth is common. To protect youth, families should prohibit smoking inside homes and cars, and communities should increase smoke-free environments.

Key words: tobacco smoke pollution, population attributable risk, youth, tobacco use

Tuesday Concurrent Session F2
10:45a-12:15p
Reproductive Health — Causes and Effects
Moderator: Lynne S. Wilcox

Change in Tobacco-Attributable Risk Percent of Low– and Very-Low–Birthweight Births — United States, 1990-2000

10:50am

Authors: ***Kelly L. Moore, MD, MPH, M. Vijayaraghavan***

Background: In the United States, smoking during pregnancy is a leading modifiable risk factor for low birthweight (LBW, <2500 grams), which increases the risk for perinatal morbidity and mortality. The percentage of pregnant women who smoked declined 33% between 1990 (18%) and 2000 (12%) in the 45 states that reported tobacco use on birth certificates. We estimated the resulting change in tobacco-attributable LBW and very-low-birthweight (VLBW, <1500 grams) singleton births.
Methods: Using birth certificate data from the National Center for Health Statistics, we created logistic regression models for 1990 and 2000 to generate tobacco-attributable risk percent estimates for the population of the 45 reporting states. We deleted <15% of each year's records because of unknown data. Variables in the final model included the mother's tobacco use, age, race/ethnicity, adequacy of prenatal care, severity of illness, education, and the infant's sex.
Results: In both 1990 and 2000, the proportion of LBW and VLBW singleton births in the study population remained about 6% and 1%. However, preliminary results indicate the tobacco-attributable risk percent dropped from 18% (95% CI, 17%-19%) to 11% (95% CI, 11%-12%) for LBW and from 10% (95% CI, 8%-12%) to 7% (95% CI, 5%-8%) for VLBW births between 1990 and 2000. Being of non-Hispanic black race more than doubles the odds of LBW, independent of smoking status. Among smokers, the odds of LBW increase as maternal age increases.
Conclusions: Declines in smoking during pregnancy from 1990 through 2000 were associated with an important reduction in tobacco-attributable LBW and VLBW births. Birth outcomes could improve by further reducing rates of smoking during pregnancy. Pregnant smokers should be informed that the odds of LBW increase as they age.

Key words: smoking, smoking cessation, pregnancy, risk factors

Maternal Characteristics and Birth Outcomes Among Foreign-Born Hispanic Women — Colorado, Florida, North Carolina, and Washington State, 1997-2000

11:10am

Authors: ***Denise R. Allen, PhD, MPH, B. Sappenfield, B. Morrow, M. Rogers, C. Ferré, The PRAMS Working Group***

Background: The percentage of U.S. live births to foreign-born Hispanic women continues to increase. These women have better birth outcomes than U.S.-born Hispanic women despite more adverse socioeconomic risk factors. Maternal characteristics and health behaviors might contribute to these differences.
Methods: Pregnancy Risk Assessment Monitoring System (PRAMS) data for Colorado, Florida, North Carolina, and Washington State were analyzed for 1997-2000. We compared maternal characteristics, health behaviors, and birth outcomes of foreign- and U.S.-born Hispanic women.
Results: Of the 7,556 Hispanic women contacted by PRAMS, 71.6% completed their questionnaire. Of these women, 66.6% were foreign-born; they were less likely than U.S.-born women to have completed high school, to be a teenager, to be unmarried, and to have received first-trimester prenatal care. They were also less likely to report ≥ 6 stressful events occurring during the year before birth (5.6% versus 11.7%; p< .01). In terms of birth outcomes, they were less likely to have a preterm delivery (8.1% versus 9.3%; p<.01) and to have a low birthweight infant (5.4% versus 7.2% versus; p<.01). With regard to maternal behaviors after an infant's birth, foreign-born mothers were more likely to report breastfeeding their infants for at least 1 month (73.1% versus 52.5%; p<.01) but less likely to report putting their infants on their backs to sleep (39.4% versus 47.4%; p<.01).
Conclusions: Compared with U.S.-born mothers, foreign-born Hispanic mothers have a mixed picture regarding socio-demographic and health risk factors that might contribute to birth outcome differences.
Public Health Implication: Understanding the reasons for better birth outcomes among first-generation Hispanic immigrants could provide insights into strategies to prevent risks among later generation Hispanic women.

Key words: U.S. live births, foreign-born Hispanic mothers, maternal health characteristics, birth outcome differences

Folic Acid Awareness Among Women — Michigan, 1996-1999

11:30am

Authors: ***Chidinma N. Alozie-Arole, MD, MPH, E. Eby, M. Reznar, B. Zhu***

Background: Periconceptional consumption of folic acid reduces the risk for neural-tube defects, which are among the most common congenital anomalies. Previous education campaigns attempted to increase folic acid awareness (FAA) among women of reproductive age. This study evaluated FAA among Michigan mothers during 1996–1999.
Methods: We analyzed data from the Pregnancy Risk Assessment Monitoring System, an ongoing, population-based survey of women with a recent live birth. A positive response to the question, "Before you became pregnant, did you know that folic acid could help prevent some birth defects?" was used as an indicator of FAA. We evaluated the prevalence and trend of FAA, and its association with race, education, and other maternal characteristics, using logistic regression.
Results: Of the women invited to participate, 7,252 (67.3%) responded. Overall, FAA increased during 1996-1999 (60.3%-71.4%; $p < 0.001$). However, since 1997, FAA decreased for certain women, including those with no high school education (59.3%-13.8%, $p = 0.05$). In addition, FAA was lower among black women (adjusted odds ratio [AOR] = 0.44; 95% confidence interval [CI] = 0.35–0.55 versus other races), women with unplanned pregnancies (AOR = 0.61; 95% CI = 0.47–0.78 versus those with planned pregnancies), and those with no high school education (AOR = 0.09; 95% CI = 0.04–0.2 versus women with college education).
Conclusions: Education efforts appear to have increased FAA among Michigan mothers. However, awareness has declined among certain subpopulations and substantial gaps exist among others. Women of reproductive age should be educated regarding folic acid benefits, regardless of reproductive plans, and special attention should be paid to women experiencing gaps or declines in FAA.

Key words: congenital anomalies, neural-tube defects, folic acid, vitamin supplementation

Reproductive History and Breast Cancer Prognosis — United States, 1980-1999

11:50am

Authors: ***Maura K. Whiteman, PhD, S. Hillis, P. Marchbanks***

Background: Each year approximately 40,000 U.S. women die of breast cancer, the second leading cause of cancer-related deaths among women. Reproductive factors are important in breast cancer etiology, but their effect on survival is uncertain. We investigated whether reproductive factors were associated with survival after breast cancer diagnosis.
Methods: We conducted a prospective study of 2,097 U.S. women originally enrolled in a multi-site case-control study whose invasive breast cancer was diagnosed between 1980 and 1982 at ages 20-45. Vital status was available through 1999 from the Surveillance, Epidemiology, and End Results (SEER) Program. We estimated adjusted relative risks (ARRs) for death from breast cancer associated with older age at first birth, lower parity, and more recent childbirth by using proportional hazards models. Covariates in the models included age, year of diagnosis, race, oral contraceptive use, body mass index, education, and family history of breast cancer.
Results: During a median follow-up of 14.3 years, 725 women died of breast cancer. Of the factors examined, time since last childbirth was associated with the risk for breast cancer death. For women with a recent childbirth (≤1 year before diagnosis), 15-year survival was 42% compared with 64% for both women with less recent childbirths (>1 year before diagnosis) and for nulliparous women. Recent childbirth was associated with an increased risk for breast cancer death compared with less recent childbirth (ARR=1.6, 95% Confidence Interval [CI]=1.1-2.3) and compared with nulliparity (ARR=1.7, 95% CI=1.1-2.5).
Conclusions: Physicians and patients should be aware that a recent birth prior to diagnosis of breast cancer may be a negative prognostic indicator. They may wish to consider this information when weighing treatment options.

Key words: breast neoplasms, mortality, pregnancy, parity

Tuesday Session G
1:45-4:00p
Go West, Young Virus — The West Nile Virus Outbreak, 2002
Moderators: Raoult Ratard & Grant L. Campbell

West Nile Virus Surveillance: Tracking an Epidemic of Historic Proportions — United States, 2002

1:50pm

Authors: ***Susan P. Montgomery, DVM, MPH, D. O'Leary, T. Marfin, A. Kipp, J. Lehman, G. Campbell***

Background: West Nile virus (WNV), a mosquito-borne flavivirus, was first recognized in the western hemisphere during a 1999 meningoencephalitis outbreak in New York. During 1999–2001, WNV activity was documented in 27 states and the District of Columbia (D.C.); 149 human cases with 18 fatalities were reported.
Methods: During 2002, 54 state and metropolitan health departments submitted surveillance data to ArboNET, CDC's national WNV surveillance system. Human WNV cases were reported by phone or fax to ArboNET; reports of WNV-infected mosquitoes, birds, equids, and other species were collected electronically. Data submitted to ArboNET included: date of collection, illness onset, county, and test results.
Results: In 2002, WNV activity was documented in 44 states and D.C. As of November 30, 3,389 humans with WNV were reported from 40 states and D.C. with illness onsets from June 10-November 4; 55% occurred in the upper Midwest. Human cases were classified as meningoencephalitis (WNME) (2,354), WN fever (704), or unspecified clinical category (331). Median age was 55 years (1 month-99 years) for all reported human cases and 59 years (1 month-99 years) for WNME cases. Case-fatality rate was 6% overall and 8% among WNME patients. Epizootic activity reported to ArboNET included 9,144 equine disease cases and 14,122 laboratory-positive birds. Of the 4,940 WNV-positive mosquito pools, 55% were *Culex* species. In more than 80% of reporting counties, evidence of non-human WNV infection preceded the first reported human case.
Conclusions: In 2002, WNV caused the largest arboviral meningoencephalitis epidemic ever documented in the western hemisphere. For the third consecutive year, WNV dramatically extended its geographic range. ArboNET continues to be important for tracking WNV activity temporally and geographically and identifying areas of increased human risk.

Key words: West Nile virus, surveillance, epidemic, meningoencephalitis

Association Between Dead Crow Reports and Human West Nile Virus Cases — Chicago, Illinois, 2002

2:10pm

Authors: ***John T. Watson, MD, MSc, K. Gibbs, W. Paul, G. Woldemichael***

Background: The 2002 Chicago West Nile virus (WNV) epidemic was unprecedented, with >200 human cases and 14 fatalities. Human cases appeared to be clustered in areas with the largest number of citizen calls regarding dead crows. This study examines the relationship between dead-crow surveillance information and subsequent human WNV cases.
Methods: As part of WNV surveillance in 2002, the City of Chicago recorded the time and location of >3,800 dead-crow reports. Dead-crow reports/mile^2 (dead-crow density, DCD) were calculated for each of Chicago's 77 community areas (CA). DCDs as of 8/10/02 (N = 1,717), which was before known human WNV cases in Chicago and 3 weeks before the epidemic peak, were compared to eventual human case rates by CA. Dead-crow reports and human-case residences were then geocoded and spatially analyzed using GIS technology. Dead-crow density was estimated using Kernel density methodology with a 1-mile radius. Areas were delineated that contained the most spatially dense 90% of dead-crow reports as of 8/10/02 (high crow-mortality areas, or HCMAs). Where census tracts were crossed, the HCMA was enlarged to conform to these. Human-case rates were then determined by census tract.
Results: The DCDs as of 8/10/02 were positively correlated by CA with eventual human-case rates of WNV (r = 0.398, 95%CI = 0.19-0.57). HCMAs as of 8/10/02 (54.1% of city surface area) included 80.5% of eventual human cases. Case rates were 9.4 cases/100,000 inside and 3.1 cases/100,000 outside of these areas.
Conclusions: Human WNV case rates in Chicago in 2002 were associated geographically with preceding dead-crow densities. This experience suggests dead-crow reports may be useful for timely identification of higher-risk areas, and thus help guide public health interventions.

Key words: West Nile Virus, epidemiology, disease outbreaks, population surveillance

Risk Factors for Infection and Predictors of Morbidity from West Nile Virus Infection — Mississippi, 2002

2:30pm

Authors: ***Theresa A. Harrington, MD, MPHTM, S. Slavinski, T. Creek, K. Ernst, R. Webb, T. Marfin, A. Anderson, R. Lanciotti, D. O'Leary, M. Currier, F.E. Thompson, Jr., L. Petersen***

Background: In 2002**,** more than 3,800 West Nile virus (WNV) cases were reported, including 188 from Mississippi. Limited U.S. data exist about risk factors for WNV acquisition or development of severe disease. We conducted a case-control study to assess these risk factors among Mississippi residents.
Methods: WNV cases (n = 71) were identified through statewide surveillance. Three age-group, and city-matched control participants per case (n = 210) were enrolled from randomly selected, computer-generated, census blocks via door-to-door campaigns. Demographic, behavioral, environmental, and medical data were collected using a standardized questionnaire.
Results: Risk factors for infection included presence of a septic tank [odds ratio=4.59; 95% confidence interval=1.46-14.95], presence of a fish or ornamental pond [OR=8.12; 95% CI=2.58-27.16], standing water under the house [OR=4.54; 95% CI=1.15-18.22)], a birdbath [OR=3.85; 95% CI=1.83-8.15] or birdfeeder [OR=2.34; 95% CI=1.26-4.35] in the yard, an unscreened porch or patio [OR=2.91; 95% CI=1.44-5.97], and abandoned property in the neighborhood [OR=4.31; 95% CI=1.5-12.45]. Sixty-four cases (90%) had at least one of these risk factors, and 35 (49%) had two or more of these risk factors. Protective factors included avoidance of mosquito-infested areas [OR=0.34; 95% CI=0.19-0.61] and staying indoors [OR=0.18; 95% CI=0.07-0.41]. Most case-patients (73%) and controls (61%) never used mosquito repellent.
Conclusions: Preliminary analysis indicates that easily modifiable factors may decrease a person's risk of acquiring WNV infection. Proper maintenance of septic tanks, eliminating sources of standing water (birdbaths, ponds, puddles) or applying larvicide, enclosing patios or porches with screens, and initiating programs to renovate abandoned property are concrete actions persons and communities can take to diminish the risk of WNV infection.

Key words: West Nile virus, case-control study, Mississippi, arbovirus, risk factor

Newly Recognized Neurologic Features of West Nile Virus Infection — Louisiana, 2002

2:50pm

Authors: ***Maryam B. Haddad, MSN, MPH, B. Tierney, G. Campbell, A. Marfin, L. Petersen, J. Sejvar***

Background: Although West Nile virus (WNV) is now established in North America, the burden of neurologic disease with WNV infection remains unclear. Better understanding might improve surveillance capability and patient care. Use of retrospective methodology and lack of standardized assessment procedures have limited previous studies of neurologic features.
Methods: Through surveillance conducted by the Louisiana Office of Public Health, we prospectively identified 44 patients with illness suggestive of WNV infection (i.e., encephalitis, meningitis, or acute muscle weakness) in seven hospitals serving St. Tammany Parish, Louisiana, during August–September 2002. We collected standardized history; clinical, laboratory, neuroimaging, and electrodiagnostic data; and performed successive neurologic assessments.
Results: Sixteen (36%) of the 44 patients had WNV infection confirmed by detection of WNV-specific IgM antibodies in cerebrospinal fluid or paired sera. Eight patients developed encephalitis; five, meningitis; and three, acute flaccid paralysis (AFP). Encephalitis patients were older than meningitis patients (median age of 70 versus 36 years, p = 0.003). Presentation frequently included fever (16, 100%), headache (15, 94%), tremor (15, 94%), vomiting (12, 75%), parkinsonism (11, 69%), myoclonus (10, 63%), and peripheral lymphocytopenia (10, 63%). AFP was asymmetric and without sensory changes; diagnostic studies suggested anterior horn cell involvement. As of December 2002, AFP patients showed no improvement, and one encephalitis patient remained on ventilator support.
Conclusions: Neurologic features prominent in these patients—tremor, parkinsonism, and myclonus—are not described in contemporary WNV studies and may be underrecognized. We found that WNV can cause a distinct AFP syndrome; awareness could prevent potentially harmful interventions aimed at other diseases (e.g., Guillain-Barré Syndrome, stroke, or myopathy). To clarify long-term prognosis, follow-up of these patients is planned through 2003.

Key words: West Nile virus, nervous system diseases, meningitis, encephalitis, paralysis

Incidence of West Nile Fever During a West Nile Epidemic — Louisiana, 2002

3:10pm

Authors: ***Catherine C. Chow, MD, MPH, J. Kruger, K. Asamoa, K. Julian, L. Pollack, S. Park, M. Charles, J. Kile, S. Montgomery, E. Click, S. Neff, A. Kipp, J. Lehman, P. Collins, R. Drewette-Card, A. MacNeil, R. Ratard, E. Brewer, A. Buff, A. Noga, D. Martin, R. Lanciotti, G. Campbell, A. Marfin, M. Bunning***

Background: Since the introduction of West Nile virus (WNV) to the U.S., human studies have focused on WN meningoencephalitis (WNME) rather than WN fever (WNF), a milder illness that may be misdiagnosed or missed. Objectives were to determine the attributable fraction of WNF among patients with unexplained fever during an epidemic of WNME, describe WNF's clinical spectrum, and quantify viremia to further assess human role in virus transmission.
Methods: Outpatients presenting with unexplained fever (T≥100.5ºF) to participating clinics (15) and emergency departments (2) were eligible. Acute-phase serum specimens were tested with quantitative polymerase chain reaction (TaqMan-PCR®) and VecTest®. Test-positive patients underwent additional sampling for virus isolation. Acute- and convalescent-phase serum specimens were tested for WNV-specific antibodies by ELISA and plaque-reduction neutralization tests. Questionnaires and medical records were reviewed to further characterize illness.
Results: From August 1 to September 4, 2002, 196 patients were enrolled; 141 were subsequently excluded for one of the following reasons: presence of identifiable fever source other than WNF (including three with WNME) (81), failure to complete study (37); absence of fever documentation (19), and lack of formal medical visit (4). From the remaining 55 enrollees, five acute-phase samples were TaqMan-PCR®-equivocal (estimated viral titer<1 PFU/mL), two VecTest®-positive, and five antibody-positive. WNF cases were not found after August 14. Median age of the five antibody-positive patients was 46 years (range, 37-55). They reported headache [3(60%)], myalgia [3(60%)], rash [2(40%)], stiff neck/neck pain [2(40%)], photophobia/eye pain [3(60%)], and ataxia [2(40%)]. None required overnight hospitalization. Virus isolation is pending.
Conclusions: Overall, 9% of unexplained fever patients had WNF. As intense WNV transmission subsides, the priority of WNF in the differential diagnosis for unexplained febrile illnesses may also decrease. Findings support that WNF is a self-limiting illness with a milder course than WNME.

Key words: West Nile fever, West Nile virus, viremia, transmission

Transmission of West Nile Virus Through Blood Transfusions — United States, 2002
3:30pm

Authors: ***Lisa N. Pealer, PhD, MHSE, R. Lanciotti, and the West Nile Transfusion Investigation Team***

Background: West Nile virus infection (WNV-I) produces a transient, usually asymptomatic viremia. Although transfusion-transmitted WNV had not been previously reported, CDC began receiving reports of possible cases in August 2002.
Methods: Specimens available from the time of donation for donors of blood components given to reported patients were tested for WNV RNA by quantitative real time reverse transcription polymerase chain reaction assay (PCR) and for IgM antibody. Donors were interviewed and tested for IgM antibody. Other recipients of components from PCR-positive donation samples were also interviewed and tested. A confirmed case was a person with WNV-I who had received a transfusion from a donor whose donation sample was PCR-positive.
Results: As of December 10, 19 states had reported 58 possible cases of transfusion-related WNV-I. Evaluation of reports included follow-up of >700 donors, testing >2000 specimens, and collaborations with >50 blood collection agencies. Of the 58 persons, 13 (ages 7-75 years, median 47 years) were confirmed as cases of transfusion-related WNV-I. Illnesses began 3-22 days (median 11 days) after transfusion of an implicated unit; reasons for transfusions included cancer, obstetric/surgical procedure, stem cell/organ transplantation, and other medical problems. Ten patients developed meningoencephalitis; 3 died. Of 8 implicated donors, 7 had symptoms compatible with a viral illness before or after donation. Initial donation samples contained WNV RNA at low concentration. The mean viremia detected by PCR in all implicated donations was 19.7 plaque forming units per milliliter (pfu/ml) (range 0.6 - 75.1 pfu/ml).
Conclusions: Documentation of WNV transmission by blood transfusion has resulted in plans to routinely test U.S. blood donations beginning as early as 2003, when new assays suitable for the donor setting are expected to be available.

Key words: West Nile Virus, transfusions, blood

Wednesday, April 2, 2003
Concurrent Session H1
8:30-10:00a
Vaccine-Preventable Diseases — Trends and Issues
Moderator: Melinda Wharton

Varicella Disease in the United States — Promising Trends and Future Challenges
8:35am

Authors: ***Christine R. Curtis, MD, A. Jumaan, B. Watson, C. Peterson, J. Zhang, P. Gargiullo, L. Mascola, J. Seward***

Background: Before varicella vaccine licensure in 1995, an estimated four million cases, 11,000 hospitalizations, and 100 deaths in the U.S. were attributed annually to varicella disease. To establish baseline data more accurately and to assess varicella vaccination program impact in the absence of national reporting, a collaborative active varicella surveillance project was initiated in 1995.
Methods: Active varicella surveillance is ongoing in Antelope Valley (AV), California, and West Philadelphia (WP), Pennsylvania. Standardized investigations entail verification of all reported cases. Data are available from 1995-2001. National Immunization Survey (NIS) data are utilized to estimate varicella vaccine coverage.
Results: In 1995, 2934 and 1197 varicella cases were verified in AV and WP, respectively. Preliminary 2001 data show striking disease declines in AV (709 cases; 75.8% decrease) and WP (174 cases; 85.5% decrease). Incidence rates declined across all age groups between 1995 and 2001, with children aged 1-4 years in AV and aged 5-9 years in WP experiencing the greatest decreases: 88.9% (48.8/1000 to 5.4/1000) and 85.1% (28.2/1000 to 4.2/1000), respectively. Vaccination coverage among children aged 19-35 months in the Los Angeles and Philadelphia areas increased from approximately 40% in 1997 to 85% in 2001, exceeding national estimates (26% and 76%, respectively).
Conclusions: Active surveillance confirmed dramatic declines in varicella disease rates following varicella vaccination program implementation. In surveillance areas and nationwide, improved varicella vaccination coverage through expansion of childcare/school entry requirements and aggressive identification and vaccination of susceptible individuals is expected to reduce disease incidence, morbidity, and mortality. National case reporting beginning in 2003 will be critical not only for varicella vaccination program evaluation but also for smallpox risk assessments among persons presenting with generalized rash illnesses.

Key words: varicella, chickenpox, epidemiology, vaccination, smallpox, variola

Varicella Vaccination Coverage Among Health-care Personnel — United States, 1997-2002

8:55am

Authors: ***Soju Chang, MD, MPH, M. Pearson, and NaSH Study Group***

Background: Varicella outbreaks are well-documented in health-care facilities and result in illness and lost work days for exposed susceptible health-care personnel (HCP). In 1997, the Advisory Committee on Immunization Practices strongly recommended varicella vaccination for all susceptible HCP.
Methods: To assess varicella vaccination coverage among HCP, we analyzed data on HCP aged 18-64 years who were recorded in the CDC's National Surveillance System for Healthcare Workers (NaSH) during January 1997 - December 2002. To determine factors associated with lack of vaccination, we conducted a case-control study. Susceptible (negative serology, no prior varicella illness) unvaccinated HCP (cases) were compared with HCP who had documented receipt of varicella vaccination (controls). HCP with contraindications to varicella vaccine were excluded.
Results: Of 71,932 HCP for whom varicella immune status was available, 8,149 (11%) were eligible for vaccination. Of these, 1,969 (25%) had documented receipt of varicella vaccine; 6,180 (75%) were susceptible but unvaccinated. The proportion of suspectible HCPs who received vaccination increased from 25% in 1997 to 36% in 2001 (÷for trend=4.80, p=0.03). Vaccination coverage was highest for HCP who were 18-30 years of age (36%), female (27%), US born (35%) or American Indian/Alaskan Native (85%). Vaccination coverage varied by occupational group, ranging from 2% (physicians) to 34% (trainees). By multivariate analysis, older age (AOR=1.02, 95% CI=1.01-1.03), Hispanic ethnicity (AOR=7.8, 95% CI=4.8-12.8), being a physician (AOR= 15.7, 95% CI=8.3-29.7) and being US born (AOR=5.5, 95% CI=4.5-6.6) were associated with lack of varicella vaccination.
Conclusions: These findings suggest that a minority of susceptible HCP have received the recommended varicella vaccination. Interventions targeted to specific HCP groups are needed to improve varicella vaccination coverage in health-care facilities.

Keywords: varicella, vaccination, healthcare personnel, health-care facility, nosocomial

A Population-Based Study of Bell's Palsy After Parenteral Inactivated Influenza Vaccines

9:15am

Authors: ***Weigong Zhou, MD, PhD, P. Rhodes, D. Shay, T. Uyeki, R. Chen***

Background: Recent post-marketing experience with a new intranasal inactivated influenza vaccine in Switzerland identified an unanticipated increase in risk for Bell's palsy (BP), a disease that causes facial paralysis. Subsequently, 157 BP cases after parenteral inactivated influenza vaccination (PIIV) were identified in the Vaccine Adverse Event Reporting System (VAERS) in the United States from 1991-2001. We conducted a population-based study to assess whether PIIV may increase the risk for BP.
Methods: We conducted a cohort study using automated data from three Health Maintenance Organizations (HMOs) in the Vaccine Safety Datalink (VSD) project. BP cases were identified by ICD-9 code 351.0. The study period (1/1/1995 – 12/31/2000) included five influenza seasons which were defined as October 1-March 31. The study subjects were persons aged ≥18 years and enrolled in the HMOs during the study period. Data were analyzed using Cox proportional hazards regression.
Results: 10,947 BP cases were identified in 14.6 million person-years, resulting an overall incidence rate of 75/100,000 person-years. The average PIIV coverage level for the five influenza seasons ranged from 5% for those aged 18-29 years to 69% for those aged 75-84 years. After adjusting for age, sex, and influenza season, a slightly higher than background risk was found in the second month after PIIV (Hazard Ratio: 1.29, 95% Confidence Interval: 1.10-1.51).
Conclusions: Our preliminary results clearly ruled out any large risk of BP after PIIV. The slightly increased risk for BP is much less than the risk of annual morbidity and mortality caused by influenza, which can be prevented by PIIV. Further analysis will evaluate possible confounding effects of other risk factors and the effect of misclassification of vaccine exposures.

Key words: influenza vaccine, vaccine safety, vaccination, Bell's palsy

Factors Associated with Receipt of Hepatitis B Vaccine Among High-Risk Adults, National Health Interview Survey — United States, 2000

9:35am

Authors: ***Nidhi Jain, MD, MPH, H. Yusuf, P. Wortley, S. Stokley, G. Euler, S. Walton, J. Singleton, R. Lyerla***

Background: Although hepatitis B vaccination has been recommended for high-risk adults since 1982, vaccination coverage rates are low. Annually, 70,000 adults are infected with the hepatitis B virus and 5,000 persons die from complications from chronic liver disease. Understanding factors associated with high-risk adults receiving vaccination are needed for program planning.
Methods: We analyzed data from the 2000 National Health Interview Survey (NHIS), a face-to-face survey conducted with non-institutionalized US residents. Of 32,374 respondents, 1091 adults 18-49 years old reported hepatitis B infection risk factors such as a history of sexually transmitted diseases and/or one or more of the following: male-male sex, intravenous street drug use, or receipt of clotting factors for hemophilia. Using SUDAAN, characteristics associated with receipt of at least one dose of hepatitis B vaccination were examined.
Results: Among high-risk adults, 33.5% reported ever receiving a hepatitis B vaccination. Persons 18-29 years old had higher coverage rates than persons 30-49 years old (39% vs. 28%, p<.05). Those with a source of routine primary care had higher coverage than those without (35% vs. 21%, p<.05) and those with more than one clinic contact within the past year had higher coverage than those with none (36% vs. 25%, p<.05). Additionally, hepatitis B vaccination was higher among high-risk adults who had received a pneumococcal or current year influenza vaccine than those who had not (52% vs. 30%, 49% vs. 29%, respectively, p<.05).
Conclusions: Reported hepatitis B vaccination is low among all high-risk adults, especially for adults without a source of routine care. Use of regular primary care services should be encouraged. In addition, strategies need to be further developed to reduce missed opportunities for vaccination.

Key words: hepatitis B vaccination, high-risk adults, coverage, routine care, missed opportunities

Wednesday Concurrent Session H2
8:30-10:00a
Parasitic and Vector-Borne Diseases
Moderator: Peter M. Schantz

Naegleria fowleri in a Drinking Water System: Two Fatal Cases of Primary Amebic Meningoencephalitis — Arizona, 2002

8:35am

Authors: ***Josef Amann, MD, MPH, V. Berisha, G. Visvesvara, M. Arrowood, S. Santana, J. Kolman, M. Shafer, R. Sriram, D. Reese, V. Waddell, V. Vaz, T. Waldbillig, D. Juranek, J. Maguire, A. Brown, R. England, J. Weisbuch, M. Beach***

Background: *Naegleria fowleri (Nf)*, a thermophilic, free-living ameba, is ubiquitous in recreational water (lakes, rivers, hot springs). Primary amebic meningoencephalitis (PAM) is a rare, fatal infection caused when *Nf*-contaminated water enters the nose while swimming/splashing and amebae migrate to the brain. Within a 24-hour period in October 2002, two healthy children died of presumptive PAM in Arizona. For the first time in the United States, two PAM infections occurred simultaneously, suggesting a common source of infection.
Methods: Interviews were conducted to reconstruct the activities of the two children during the 2-week incubation period and identify common exposures. Environmental samples from recreational water sites, homes, and the drinking water system were tested for bacteria or amebae. New methods for concentrating/eluting amebae from water samples were developed. Amebae cultured from water concentrates or in brain tissue were identified by immunofluorescent-antibody staining.
Results: PAM was laboratory-confirmed in both children. The children had no shared activities/contact nor had obvious exposures to recreational water. However, both children engaged in activities that may have led to nasal entry of amebae-contaminated water from the same municipal drinking water system, which wasn't required to chlorinate or filter. There were elevated levels of bacteria in the water supply, and *Nf* was isolated from a municipal water tank and a refrigerator filter in the home where one child bathed.
Conclusions: The presence of *Nf* in the water supply suggests that transmission occurred following nasal contact with untreated municipal drinking water, the first occurrence of drinking water transmission in the United States. Data from this investigation prompted routine chlorination of the water system and have implications for other non-disinfected drinking water systems in similar ecologic settings.

Key words: *Naegleria fowleri*, primary amebic meningoencephalitis, drinking water, ameba, waterborne disease

Tick-Borne Relapsing Fever Outbreak Following a Family Gathering — New Mexico, August 2002

8:55am

Authors: ***Chad B. Smelser, MD, R. Groves, R. Enscore, M. Schriefer, P. Ettestad***

Background: Tick-Borne Relapsing Fever (TBRF) results from infection with one of several spirochete species of the genus *Borrelia*. Ticks of the genus *Ornithodoros* transmit the spirochetes to humans. Recurring fevers, headache, chills, rash, arthralgias, myalgias, nausea and/or vomiting characterize TBRF. Outbreaks have been associated with rodent-infested dwellings, especially cabins in endemic areas above 4,000 feet in elevation. In August 2002, the New Mexico Department of Health was notified of relapsing fever among participants at a family gathering.
Methods: A TBRF case was defined as a person in attendance with spirochetes detected in peripheral blood smear or blood culture. Case finding involved review of public health nurse interviews, medical records, and laboratory results. The site was investigated 1 month after the gathering and after cabin fumigation for peridomestic rodents and ticks. Blood smear, serology and culture for *Borrelia* were completed on trapped rodents.
Results: Among 39 attendees, 11 (28%) cases were detected within the accepted incubation period for TBRF, three were male and eight female, and the median age was 51 (range 4-80 years). Ten of 11 cases entered or spent the night in the cabin. The attack rate was higher in persons who lived > 50 miles from the event site (11/21 or 52% vs. 0/17; RR undefined). Site investigation revealed abundant rodent nesting materials in the cabin. Six rodents were trapped; none tested positive for spirochetes. The single tick recovered fed on a laboratory mouse, and subsequently, the mouse developed spirochetemia.
Conclusions: The outbreak occurred after exposure to a tick-infested cabin. Living near the event site appeared to be protective against infection, suggesting possible immunity to *Borrelia* infection. Rodent-proofing the premises might prevent further exposure to *Borrelia* carrying ticks.

Key words: *Borrelia*, relapsing fever, fever, *ornithodoros*, tick

A Case-Control Study of Risk Factors for Sporadic Cryptosporidiosis — United States, 1999-2001

9:15am

Authors: ***Sharon L. Roy, MD, MPH, S. DeLong, S. Stenzel, B. Shiferaw, J. Roberts, A. Khalakdina, R. Marcus, R. Nelson, S. Segler, D. Shah, S. Thomas, D. Vugia, S. Zansky, V. Dietz, M. Beach***

Background: Many studies have evaluated the role of *Cryptosporidium parvum* in waterborne-disease outbreaks of gastroenteritis and in potentially life-threatening enteric illness among immunocompromised persons. However, the epidemiology of sporadic cryptosporidiosis among immunocompetent persons is less well understood. This is the first multi-state study to assess the risk factors for sporadic laboratory-confirmed cryptosporidiosis among immunocompetent persons in the United States.
Methods: Between February 1999 and August 2001, we conducted a matched case-control study of 282 persons with laboratory-identified cryptosporidiosis from eight Foodborne Disease Active Surveillance Network (FoodNet) sites and 490 age and geographically matched controls recruited through random or sequential digit dialing. Participants responded to a standardized telephone questionnaire about exposures during the 2 weeks prior to onset of illness. Multivariate conditional logistic regression generated matched odds ratios (ORs) adjusted for demographics, degree of urbanization, and health status.
Results: Risk factors associated with cryptosporidiosis in the multivariate analysis included: international travel (OR=10.9; 95% confidence interval [95%CI]=2.9-40.5); contact with cattle (OR=3.3; 95%CI=1.5-7.4); contact with children 2-11 years old with diarrhea (OR=3.2; 95%CI=1.4-7.0); and consumption of well water away from home (OR=2.0; 95%CI=1.0-3.9). More specifically, this well water variable was significant for persons living in towns or villages (univariate OR=4.9; 95%CI=1.0-24.1) where small community or individual wells are common. Raw vegetable consumption had an OR=0.5 (95%CI=0.3-0.9) in the multivariate analysis.
Conclusions: The results support the need for ongoing public health education to prevent cryptosporidiosis, particularly among travelers, animal handlers, and child caregivers. This study also underscores the need for further assessment of small community and individual wells as a source of infection and of the role of raw vegetables.

Key words: cryptosporidiosis, diarrhea, risk factors, water

Knowledge, Attitudes, and Behavior Regarding Lyme Disease in Three Health Districts — Connecticut, June–July 2002

9:35am

Authors: ***Kevin S. Griffith, MD, MPH, S. Ertel, M. Cartter***

Background: Lyme disease (LD) is the most commonly reported vector-borne disease in the United States. Since 1991, Connecticut has had the highest rate of reported LD of any state. To help guide the development of community-based prevention initiatives, we conducted a survey of knowledge, attitudes, and behavior in June-July 2002.
Methods: In a telephone survey of households in three health districts, interviewers asked about self-reported LD knowledge, perceived LD risk, use of personal prevention (checking for ticks, using repellent, avoiding brush, wearing long pants, tucking pants into socks), use of environmental prevention (spraying pesticides, using pesticide tubes or boxes, removing brush, fencing property, using landscape barriers) and physician-diagnosed LD in 2001.
Results: Of 1,200 respondents, 81% reported "a lot" or "some" LD knowledge, 67% considered LD a "very" or "somewhat" serious problem, and 59% thought it was "very" or "somewhat" likely a household member would get LD in the coming year. While 60% to 91% used personal prevention, only 2% to 53% used environmental prevention. Four percent of households had at least one person with physician-diagnosed LD in 2001. Using census data regarding occupied households, we estimate at least 3,442 persons in these three districts had LD diagnosed in 2001. In contrast, 394 cases from these three districts meeting the national surveillance case definition were recorded in 2001.
Conclusions: Public concern for LD and perception of ongoing risk remain high. While use of personal prevention was high, use of environmental prevention was low. Current initiatives should provide education and resources to improve the use of environmental interventions. In addition to guiding prevention, community surveys can provide a more accurate assessment of LD burden.

Key words: tick-borne disease, Lyme disease, knowledge, attitudes, practice, primary prevention

Wednesday Concurrent Session I1
10:30a-12:15p
HIV and Sexually Transmitted Diseases
Moderators: Robert S. Janssen & Gail A. Bolan

Epidemiologic Data from the First 12 Months of Named HIV Surveillance — New York City, June 2000 –May 2001

10:35am

Authors: ***Susan E. Manning, MD, C. Ramaswamy, L. Jones, D. Figueroa, S. Ly, S. Forlenza, J. Sackoff, L. Torian, R. Dicker, D. Nash***

Background: Epidemiologic surveillance data on new HIV diagnoses capture aspects of HIV transmission that cannot be ascertained by tracking AIDS cases alone. To supplement AIDS case-reporting, regulations were implemented in New York in June 2000 mandating that health-care providers and laboratories report newly diagnosed cases of HIV infection (non-AIDS). We summarized surveillance data in New York City (NYC) from the first 12 months of HIV reporting.
Methods: HIV cases diagnosed during June 2000 – May 2001 and reported to the surveillance system through September 2002 were analyzed. Rates and rate ratios (RR) were calculated using 2000 census data. Odds ratios (OR) compare persons diagnosed concurrently with HIV and AIDS to those diagnosed with HIV only (non-AIDS).
Results: Between June 1, 2000 and May 31, 2001, 9,175 persons in NYC (114.6/100,000) were diagnosed with HIV. Of these, 5,777 (63%) were male and 3,398 (37%) were female. The rate of new HIV diagnoses was significantly higher in blacks (RR=5.6, 95% confidence interval (CI)=5.5–5.8) and Hispanics (RR=2.9, 95%CI=2.8–3.0) versus whites. Among those newly diagnosed with HIV, 2,290 (25%) persons were concurrently diagnosed with AIDS. Concurrent HIV and AIDS diagnoses were more likely to occur among males versus females (OR=1.3, 95%CI=1.2–1.4), blacks (OR=1.3, 95%CI=1.2–1.4) and Asian-Pacific Islanders (OR=1.7, 95%CI=1.1–2.6) versus whites.
Conclusions: Newly available HIV surveillance data in NYC indicate that persons newly diagnosed with HIV and persons presenting at later stages of HIV illness are predominantly male and from racial and ethnic minorities. These subgroups should be targeted for testing and prevention strategies. An ongoing evaluation of the system will provide important information on the timeliness and completeness of these new surveillance data.

Key words: AIDS, HIV, New York City, surveillance

Large Increases in Early Syphilis — San Francisco, California, 2000-2002

10:55am

Authors: ***William Wong, MD, C. Kent, J. Klausner***

Background: Early syphilis infection can cause severe neurological complications and facilitate HIV transmission. Since 2000, reported cases of early syphilis have increased in San Francisco from 71 cases to 462 in 2002. To further describe demographic characteristics and behavioral trends of early syphilis cases, we analyzed surveillance data.
Methods: We defined a case of early syphilis as a positive lesion by dark-field microscopy or by reactive serologic tests for syphilis in a San Francisco resident. We compared surveillance data for 2000-2002 using $\div^2$ tests for linear trend.
Results: Among 727 early syphilis cases reported during 2000-2002, 96.3% were male, 59.8% were white, and the median age was 37 years (range 16-67). During 2000-2002, the proportion of cases increased in men who have sex with men (MSM) from 81% (50/62) to 92% (391/424; p = 0.018) and in human immunodeficiency virus (HIV)- infected persons from 41% (24/59) to 67% (241/362; p < 0.001) where sex partner gender and HIV status was known. Among interviewed cases, the proportion that used methamphetamine increased from 8% (5/67) to 26% (109/340; p < 0.001). During the period in which infection might have been acquired, the proportion of cases that reported having two or more sex partners increased from 77% (48/62) in 2000 to 89% (302/340; p value = 0.02) in 2002. The proportion of cases that met sex partners via the Internet increased from 19% (13/67) in 2000 to 31% (109/347; p<0.001) in 2002.
Conclusions: The increase in early syphilis noted in San Francisco during 2000-2002 particularly affected MSM and HIV-infected persons. Prevention measures should target persons at-risk including those who use methamphetamine and meet sex partners via the Internet.

Key words: syphilis, men who have sex with men, human immunodeficiency virus

HIV Sexual Risk Behaviors Among Female Sex Partners of Injection-Drug Users — Orel, Russia, 2002

11:15am

Authors: ***Laura N. Broyles, MD, S. Santibanez, L. Paxton, R. Garfein, N. Gusseynova, R. Sofranova***

Background: HIV incidence in Orel, Russia has increased >40-fold since 1998, primarily among male injection-drug users (IDUs). However, heterosexually transmitted HIV infections are increasing steadily, especially among women whose sex partners are IDUs. To develop appropriate interventions, we assessed sexual risk behaviors among female sex partners (FSPs) of IDUs.
Methods: Women who reported recent vaginal sex (within 60 days) with a current or former IDU completed a self-administered questionnaire. The convenience sample was recruited by street outreach (58%) or referral by Orel AIDS Center or Narcology Center staff (42%).
Results: Of 101 women screened, 81 were eligible and completed questionnaires; 14 (17%) were IDUs themselves. Of the 67 (84%) women with steady sex partners, 35 (52%) had not used a condom with that partner in the past month. Of the 32 (41%) who reported casual sex partners, only 16 (50%) always used condoms with them. Among all participants, history of sexually transmitted disease (STD) or abortion was reported by 22 (28%) and 34 (43%), respectively. Only one woman reported difficulty obtaining condoms. More FSPs who were IDUs, compared with non-IDUs, reported a steady partner who was a current IDU (92% vs. 51%, p=0.022), never using a condom with that partner (58% vs. 24%, p=0.017), and casual sex partners (64% vs. 34%, p=0.034). IDUs and non-IDUs did not differ in condom use with casual partners or history of STDs or abortion.
Conclusions: FSPs of IDUs in Orel are at significant risk for heterosexually acquired HIV infection. Interventions that promote condom use for HIV/STD prevention and contraception are urgently needed to prevent sexually transmitted HIV infections and reduce risk for mother-to-child transmission.

Key words: HIV, women, intravenous drug users, sex partners, condoms

Evaluation of Clinician's Adherence to CDC's Guidelines for the Treatment of *Chlamydia trachomatis* Infection in Two Large Health Plans — Colorado and Minnesota, 2000

11:35am

Authors: ***Waimar Tun, PhD, MHS, C. Walsh, M. Stiffman, D. Magid, L. Anderson, T. Defor, C. Westrum, E. Lyons, N. Strub, L. Cherney, K. Irwin***

Background: An estimated 3 million chlamydial infections occur annually; private clinicians diagnose over half of reported cases. Because little is known about chlamydia treatment among private clinicians, we evaluated adherence to CDC's chlamydia treatment guidelines in two health plans.
Methods: In 2000, 743 (82%) of 907 clinicians in two large health plans completed a mailed survey on chlamydia treatment practices, and use of CDC's most recent Treatment Guidelines (1998). Guideline adherence was defined as reported use of any CDC-recommended antibiotics in clinical scenarios of patients with laboratory-confirmed chlamydial infection. We identified factors associated with reported adherence using univariate and multivariate analyses.
Results: The majority of respondents were male (51%), physicians (73%), and specialized in general medicine (55%). Most clinicians reported referring to (74%) and adhering to (91%) CDC guidelines. Non-physicians (85%) were significantly more likely than physicians (70%) to report referring to CDC guidelines. Only 66% would prescribe single-dose azithromycin, which optimizes compliance, to injection drug users (IDUs). In univariate analysis, guideline adherence was significantly associated with being female (Odds ratio [OR]=1.8; 95% confidence interval [CI]=1.0-3.2), and referring to CDC guidelines (OR=1.9; CI=1.1-3.4), but not with clinical specialty, years in practice, or chlamydia treatment experience. In multivariate analysis, the only factor significantly associated with adherence was referring to CDC guidelines, and this association was strongest among non-physicians (Adjusted OR=10.5; CI=2.9-38.2). Respondents preferred receiving STD information through printed guidelines (67%) and in-service training (65%), than through other print, on-line sources, or colleagues.
Conclusions: Most clinicians reported referring and adhering to CDC guidelines. Interventions to improve use of and adherence to guidelines should focus on non-physicians, optimal IDU treatment, and rely on printed guidelines and in-service training.

Key words: *Chlamydia trachomatis*, practice guidelines, guideline adherence

Association Between Use of Reminders and Adherence to Antiretroviral Therapy Among HIV-Infected Persons — United States, 2000-2002

11:55am

Authors: ***Eyasu H. Teshale, MD, M. Campsmith, G. Nakamura, E. Begley, D. Swerdlow***

Introduction: HIV-infected persons who adhere to antiretroviral therapy (ART) have better clinical outcomes than those who do not. Clinicians recommend using reminders to increase adherence. We examined whether use of reminders is associated with adherence.
Methods: Using data from the Supplement to HIV/AIDS Surveillance project, a multisite behavioral surveillance project in which persons with HIV/AIDS are interviewed, we selected participants who were taking ART and were interviewed between May 2000 and July 2002. We defined adherence as not skipping any doses in the 48 hours before interview. Using participant response as to which reminders they used (from a list of 13 reminders), we performed logistic regression analysis, controlling for demographic and clinical variables.
Results: Of the 3152 who were taking ART, 2549 (81%) adhered to ART and 1749 (56%) used one or more reminders. The most commonly used reminders included using a pill box (56.2%), taking medicines at the same time (47.1%), and putting pills out so they are visible (36.3%). Higher adherence was associated with use of two or more reminders (86%) compared with only one reminder (79%), (OR; 1.5, 95% CI=1.1-1.9) or no reminder (80%), (OR; 1.4, 95% CI=1.1-1.8). In the regression model, adherence was associated with attending adherence programs (AOR; 1.9, 95% CI=1.0-3.4), taking medicines at the same time every day (AOR; 1.5, 95% CI=1.1-1.9), and having someone remind the patient to take medicines (AOR; 1.5, 95% CI=1.1-2.1).
Conclusions: We found an association between adherence to ART and the number of reminders used. Adherence was also associated with attending adherence programs. Promoting use of reminders may improve adherence to ART, which could decrease morbidity among HIV-infected persons and have significant public health importance.

Key words: antiretroviral therapy, HIV, AIDS, adherence, reminder

Wednesday Concurrent Session I2
10:30a-12:15p
Nosocomial Nightmares — Healthcare-Associated Outbreaks
Moderator: William R. Jarvis

When a Good Fit Goes Bad: Allograft-Associated Infections in Anterior Cruciate Ligament Reconstructive Surgery — California, 2002
10:35am

Authors: ***Christine R. Crawford, ScD, M. Kainer, C. Friedman, F. Ahmed, D. Jernigan, R. Armstrong, L. Archibald***

Background: Since 1990, use of allografts in surgical procedures has almost doubled in the United States, and concern about allograft-associated infections (AAI) has increased.
One outpatient surgery center (Center-X) experienced an outbreak of allograft-associated infections following anterior cruciate ligament (ACL) reconstructive surgery beginning December 2000.
Methods: A case was defined as a surgical site infection in a patient who underwent ACL reconstructive surgery at Surgery Center X between its opening in February 2000 and March 31, 2002. Data collected included demographics, medical and surgical information, graft details, method of tissue processing for allografts (aseptic or sterile), and infection characteristics.
Results: Of 331 patients who underwent ACL surgery, 11 (3.3%) met the case definition. AAIs all occurred at the tibial fixation site of the graft and involved 8 different microorganisms. The median time to positive culture was 48 days. The attack rate among those receiving aseptically processed allografts was 4.7% (11/249), compared with 0% among those receiving autografts or allografts processed with sterile technique (p =0.07). Use of a supplementary staple for tibial fixation compared with other methods of fixation without the supplementary staple, increased the risk of infection ten fold in univariate analysis (RR = 10.0, CI = 3.0-32.9), and nine fold when controlling for tissue processing technique (RR = 9.0, CI = 2.8-28.8).
Conclusions: In our study, all AAIs occurred in patients receiving aseptically processed allografts. Thus, the tissue processing method should continue to be considered a risk factor for AAIs. Other factors, such as implanted hardware, might constitute additional risks for AAIs.

Key words: allografts, anterior cruciate ligament, orthopedic equipment, nosocomial infection

A Cluster of *Phialemonium* Infections Among Hemodialysis Patients — Illinois, 2002
10:55am

Authors: ***Thomas A. Clark, MD, MPH, G. Huhn, C. Conover, M. Arduino, R. Hajjeh, P. Kammeyer, M. Brandt, S. Fridkin, D. Warnock***

Background: Over 200,000 persons in the US receive chronic hemodialysis, of whom 15% develop a bloodstream infection. Fewer than ten cases of invasive mold infection with *Phialemonium* species are reported in the literature, and none among hemodialysis patients. Between February 7, 2001 and August 27, 2002, four cases of invasive *Phialemonium* infection occurred among patients of Hemodialysis Center A (HCA), Illinois. We investigated this cluster to identify potential environmental sources and host factors associated with infection.
Methods: We defined a case as isolation of *Phialemonium* from a patient of HCA between September 2000 and December 2002. Case finding was conducted through reviewing microbiologic and surveillance data. We reviewed medical records of case patients, observed hemodialysis and infection control procedures, and collected multiple environmental specimens for culture. Clinical isolates were analyzed for similarity by 28S ribosomal subunit sequencing.
Results: We identified four cases. At the time of infection, each case patient had required chronic hemodialysis >3 years and had an AV graft or fistula (AVGF). Three case patients developed disseminated infection, two of whom died of the infection. Water treatment was adequate; however, we observed sub-optimal aseptic technique for AVGF site and dialysis catheter preparation. Numerous cultures of environmental surfaces, tap water, and standing water grew molds, but no *Phialemonium* species. Preliminary molecular typing of three clinical isolates revealed differing 28S sequences.
Conclusions: *Phialemonium* is a newly described cause of fatal disease in hemodialysis patients. No ongoing environmental source of exposure was found, however, an intermittent or past common source cannot be excluded. Strict adherence to aseptic technique should be maintained in outpatient hemodialysis centers.

Key words: nosocomial infections, mycoses, renal dialysis

Investigation of Nosocomial *Candida parapsilosis* Blood Stream Infections — Denver, Colorado, September, 2002

11:15am

Authors: ***Sharmila Shetty, MD, J. Duffy, M. Brandt, T. Lott, L. Benjamin, M. Phelan, R. Hajjeh, S. Fridkin, J. Morgan***

Background: Candidemia is the fourth most common cause of hospital-acquired bloodstream infections (BSI), with *Candida parapsilosis* (Cp) causing 10% of these. Cp, commonly found on health-care worker (HCW) hands, is historically associated with BSI among neonates and TPN use, although reports of outbreaks among adults have been increasing. In 2002, Hospital A experienced a ninefold increase in Cp BSI rates in adults, with most patients receiving total parenteral nutrition (TPN). We conducted a case-control study among patients receiving TPN and further investigations to determine the source of the outbreak, and recommend control measures.
Methods: A Cp BSI case was defined as a hospitalized adult with a positive Cp blood culture during April-August 2002. Three hospitalized adults receiving TPN were randomly selected as controls for each case. We performed HCW hand hygiene (HH) observations, and HCW hand culture using the handiwipe method. Molecular subtyping was done on clinical blood isolates using electrophoretic karyotyping and randomly amplified polymorphic DNA.
Results: Eight Cp BSI cases (75% male, median age 48) and 24 controls were enrolled. Only hospitalization >33 days was independently associated with increased risk of Cp BSI (OR 8.5, 95% confidence interval, [CI]=1-64). Only 18/103 (17%) of HCW performed HH prior to patient contact. None of the 100 hand culture samples obtained grew Cp, although 38% grew other yeast. Molecular subtyping revealed that isolates represented different strains.
Conclusions: Our results demonstrate that no single strain was responsible for this outbreak. Suboptimal HH practices among patients who have long hospital stays and who receive TPN may have contributed to this outbreak. We recommend enforcing strict HH guidelines amongst HCWs, and encouraging the use of alcohol-based antiseptic products.

Key words: *Candida parapsilosis*, bloodstream infections, hand hygiene

Mycobacterium tuberculosis Transmission at Three Hospitals and at a Hostel with Oncology Patients — Illinois and Missouri, 2002

11:35am

Authors: ***Joseph L. Malone, MD, K. Ijaz, L. Lambert , L. Rosencrans, L. Phillips, V. Tomlinson, E. Brasher, M. Arbise, V. Chmura, M. Dworkin, E. Simoes***

Background: Immunocompromised patients have increased risk for tuberculosis (TB) reactivation and progression to active disease. In January 2002, two related leukemia patients (index patient, Patient 2) were diagnosed with active pulmonary TB. The index patient received care at 3 hospitals (A, B, C), stayed in a hostel lodging oncology patients, and exposed Patient 2 at all facilities except A. When health officials identified three additional oncology patients with recently diagnosed pulmonary TB at Hospital C, we investigated the possibility of nosocomial transmission of *Mycobacterium tuberculosis (M.tb.*)
Methods: We determined genotypes by restriction fragment length polymorphism (RFLP) for all available *M.tb* isolates from recent TB patients at facilities A—C and the hostel. We reviewed records for those with genotypically identical *M.tb* isolates, and performed tuberculin skin testing (TST) and active TB case finding of their close contacts.
Results: Of the 5 *M.tb* isolates tested, only those from the index patient and Patient 2 had identical genotypes by RFLP. The index patient and Patient 2 had no baseline TST results. The index patient had clinical evidence of infectiousness (cough, fever, pulmonary infiltrates, without airborne isolation) for 3 months before TB diagnosis. Among employee contacts of the index patient, TST conversions occurred for 1/59, 2/34, 2/32, and 0/8 persons tested at facilities A-C, and the hostel, respectively. Among others exposed to the index patient, 1/31, 1/30, 2/15, and 11/135 tested had positive TSTs at facilities A-C, and the hostel respectively.
Conclusions: Delayed TB diagnosis resulted in *M.tb* transmission between two oncology patients, and possibly to contacts in hospital and oncology hostel settings. Earlier screening and clinical recognition could reduce health-care– associated *M.tb* transmission among oncology patients.

Key words: tuberculosis, cross infection, neoplasms, disease transmission, Patient-to-Professional, Restriction Fragment Length Polymorphism

Nosocomial Transmission of a Community-Associated Strain of Methicillin-Resistant Staphylococcus aureus (MRSA) by a Colonized Health-Care Worker

11:55am

Authors: ***Ralph J. Groves, MD, MA, C. Mason, D. Boxrud, J. Cheek***

Background: A steady increase in the incidence of community associated MRSA (CA-MRSA) indicates antimicrobial resistance is no longer a problem solely in the hospital setting. The recent occurrence of four pediatric deaths from systemic CA-MRSA infection has demonstrated the consequences can be severe. We investigated a cluster of MRSA skin infections occurring in nine otherwise healthy newborns over an 8-month period at a large hospital to determine the source of their infections.
Methods: We employed a case-control study to evaluate for potential hospital and community sources. A case was defined as a newborn with culture-confirmed MRSA skin infection occurring <30 days from delivery. Control patients were selected from infants delivered at the hospital during the cluster timeframe. Hospital staff (N=58) with potential for contact with case-patients answered a questionnaire and underwent nasal sampling for MRSA. Household members of case and control infants were evaluated for MRSA carriage. Pulsed-field gel electrophoresis (PFGE) was performed on cluster-associated MRSA isolates.
Results: The only health-care worker (HCW1) colonized with MRSA was significantly more likely to be the primary caregiver for cases (seven of nine) in the peripartum period (OR = 63, 95% CI = 3.74-2984). MRSA isolates from seven cases and HCW1 displayed identical PFGE patterns (community-associated pattern MR391, Minnesota Department of Health laboratory). Additionally, HCW1 wore a nose stud; no other staff had nasal piercing. Repeat swabs from the nares and external piercing site of HCW1 grew MR391. Household sampling (N=80) demonstrated MRSA carriage in two family members of HCW1 and the mother of one patient.
Conclusions: CA-MRSA colonizing a health-care worker can be the source of a nosocomial outbreak. Nose piercing might increase risk of staphyloccocal colonization.

Key words: methicillin resistance, staphylococcal skin infections, hospital infections, newborns, pulsed-field gel electrophoresis

Wednesday Meet the Authors Poster Session 12:30-1:30p

Vaccine-Preventable Diseases

Poster No. 16
False Alarms for Smallpox — United States, 2002

Authors: ***Mona Marin, MD, K. Galil, J. Seward, L. Rotz, I. Damon, R. Harpaz, J. Cono, J. Iskander, S. Schmid, and CDC Rash Illness Response Team***

Background: Following the Fall 2001 anthrax attacks, health departments received numerous requests to test patients for smallpox. Limited knowledge about smallpox and its diagnosis lead to inappropriate requests for smallpox testing and a high probability of false-positive results. Therefore, CDC developed a clinical algorithm to stratify patients with suspected smallpox into high, moderate, and low risk of smallpox, with testing recommended for high risk patients. We evaluate CDC experience with this algorithm.
Methods: CDC provides 24/7 hotline consultation to health department personnel and physicians to help evaluate patients with acute, generalized vesicular/pustular rash illnesses. Patients are classified for smallpox risk using three major and five minor smallpox clinical criteria of the algorithm. Digital photographs and follow-up clinical and laboratory data are obtained to document the final diagnosis.
Results: During 2002, CDC received 25 calls from 15 states and New York City. Most calls came from acute care physicians (7), subspecialty physicians (6), and state/local health departments (5). Eight (32%) were persons <18 years of age. No patient was classified as high risk for smallpox, four (16%) were moderate risk, and 21 (84%) low risk. Varicella infection, the most common final diagnosis, was made in 75% of moderate risk and 48% of low risk patients. One patient was tested for smallpox virus. Hospital and emergency room closures and diversions occurred in 5 instances but use of the algorithm reversed the decisions.
Conclusions: The algorithm provided a framework for systematic evaluation that helped with the public health response for suspected smallpox patients. Training of health-care providers on algorithm use is needed to rapidly classify patients for risk of smallpox while preventing unnecessary disruptions of the medical and public health systems.

Key words: smallpox, smallpox clinical criteria, rash illness algorithm, smallpox risk classification

Poster No. 17
When Does a Good Vaccine Fail? Tracking Pneumococcal Disease in Children Receiving the Pneumococcal Conjugate Vaccine — United States, 2001-2002

Authors: ***Sarah Y. Park, MD, C.A. Van Beneden, M.T. Martin, R. Facklam, C.G. Whitney***

Background: In 1999, *Streptococcus pneumoniae* caused 17,000 bloodstream infections, 800 meningitis episodes, and 200 deaths in children <5 years. In 2000, an effective pneumococcal vaccine (PCV7) covering the seven serotypes causing 80% of invasive pediatric infections became part of routine childhood vaccinations. To assess factors associated with occasional poor PCV7 performance, we began tracking infections among vaccinated children.
Methods: We collected isolates and standardized reports (including demographics, illness onset, infection type, outcome, chronic illnesses, and vaccine history) of invasive pneumococcal infections in children <5 years who received ≥1 PCV7 dose. Isolates underwent serotyping. We defined breakthrough infections as those caused by PCV7 serotypes. Using the chi-square test, the serotype distribution was compared to that of isolates collected in 1999 through population-based surveillance.
Results: From October 2001 – September 2002, 126 infections were reported from 34 states; 37% (n = 46) were breakthrough infections. Serotypes 6B and 19F comprised 37% (n=17) and 26% (n=12) of breakthrough infections, respectively, compared to 13% and 14% (p<0.0001 and p=0.02), respectively, of infections caused by PCV7 serotypes in children before vaccine licensure. Nearly half (n=21) of breakthrough cases occurred in children not appropriately vaccinated for age. Only six (13%) received all recommended doses; five were vaccinated following a catch-up schedule requiring fewer doses, and two had chronic illnesses. We found no association between breakthrough infections and specific vaccine lots.
Conclusions: This new tracking system suggests that serotype 6B and 19F antigens may be less protective than other vaccine antigens. Also, the catch-up vaccine schedule may be less effective than the routine infant schedule. As more data become available, further evaluation of these findings may help refine vaccination strategies.

Key words: *Streptococcus pneumoniae*, heptavalent pneumococcal conjugate vaccine

Poster No. 18
Outbreak of Influenza A in a Neonatal Intensive Care Unit— Richmond, Virginia, February 2002

Authors: ***Akinyi Adija, MD, E. Barrett, S. Jenkins***

Background: Although rarely reported among neonates, nosocomial outbreaks of influenza can cause serious life-threatening complications. In February 2002, we investigated an outbreak of influenza A in a neonatal intensive care unit (NICU).
Methods: A case was defined as either laboratory-confirmed influenza or cough with fever/chills and one of the following signs or symptoms: sore throat, headache, muscle or body aches, and nasal or chest congestion during January 29 — February 5, 2002. Questionnaires regarding clinical symptoms and vaccination status were administered to all persons in the NICU during the study period. We reviewed infant charts to assess gestational age, birth weight, and medical history. Serial nasopharyngeal samples were collected during a 2-week period for viral culture and direct immunofluorescence testing.
Results: Seven of 12 (58%) infants and nine of 78 (12%) employees were identified as case-patients. Supportive medical care was provided to all symptomatic persons; no deaths occurred. Predominant signs in infants included cough, irritability, and nasal congestion. Although not statistically significant, infected infants were older (66 versus 28 days; p=0.21), had lower birth weights (1,080 versus 1,380 g; p=0.43) and had lower gestational ages (27 versus 30 weeks; p=0.23). The employee vaccination rate before the outbreak was 43% (34/78). An unvaccinated nurse was identified as the likely index source but was never laboratory-confirmed.
Conclusions: An influenza outbreak among infants in a NICU occurred in the setting of low vaccination rates among health-care workers. Influenza should be recognized as a potential source of respiratory infections among infants in NICUs. Hospital educational resources and prevention guidelines should promote compliance with influenza vaccination among staff and patients' family members to reduce the risk for future outbreaks.

Key words: influenza, vaccination, nosocomial infection, neonatal

Poster No. 19
Oculo-Respiratory Syndrome Following Influenza Vaccine — United States, 1990-2002: New or Previously Unrecognized?

Authors: ***Alena Y. Khromova, MD, MPH, V. Pool, R. Chen***

Background: During the 2000-2001 influenza season in Canada, a previously unknown adverse event (AE) - Oculo-respiratory Syndrome (ORS) - was reported by ~1000 influenza vaccinees. While initially attributed to vaccine production problems, active surveillance during 2001-2002 suggest ORS persists albeit at a lower level. We assessed whether ORS may have also been reported in the US but had remained unrecognized.
Methods: We searched the US Vaccine Adverse Event Reporting System (VAERS) for reports received 1990-2002 that met the Canadian definition for possible ORS case: onset of any of the following symptoms ≤24 hours after vaccination and lasting ≤48 hours: bilateral red eyes, facial edema, cough, sore throat, chest tightness, wheezing, difficulty breathing. The VAERS text for possible ORS cases were then manually reviewed and classified as a probable ORS case based on both appropriate symptoms and same day onset.
Results: Of 18,773 influenza VAERS reports, 2012 (11%) met the case definition for possible ORS: 146 of the possible cases had primarily "conjunctivitis" symptoms, 130 (89%) of which were classified as probable ORS; 308 (79%) of 390 possible cases with primarily "facial edema" symptoms were classified as probable ORS; review of 1476 possible cases with primarily respiratory symptoms is ongoing but at least 188 (13%) are probable ORS. Females predominated among the probable ORS cases (81% vs. 66% among all influenza AE reports, OR=1.8, 95%CI=1.39-2.31). The reporting rate of possible ORS cases by year varied from 2.2 to 6.8 per million doses.
Conclusions: ORS had probably been reported to VAERS since its inception in 1990 but remained unrecognized due to the nonspecific nature of its constituent symptoms. Research to identify the etiology of ORS is needed.

Key words: influenza vaccine, adverse event, ocular, respiratory, syndrome

Poster No. 20
Targeting the Right Mammals: Risk Factors for Human Contact with Oral Rabies Vaccine — Pennsylvania and Virginia, 2002

Authors: ***Michael O'Reilly, MD, MPH, C. Hanlon, J. Wright, J. McQuiston, C. Rupprecht***

Background: In an effort to control the expanding boundaries of the raccoon rabies epizootic in the eastern United States, >10 million baits containing an oral rabies vaccine (ORV) were distributed by airplane and ground-based staff in various states in 2002. The vaccine is a live, attenuated, recombinant vaccinia-rabies glycoprotein (V-RG) virus sealed in plastic and encased in the middle of a fishmeal bait. One human vaccinia virus infection from contact with ORV bait was recognized in 2000, but surveillance has been limited to date. The objectives of this study were to assess the incidence of and risk factors for human contact with ORV baits.
Methods: Contact was defined as 1) skin/mucous membrane contact with fishmeal bait alone, or 2) skin/mucous membrane exposure to the V-RG virus vaccine. Bait contacts from August 5, 2002 to November 14, 2002 in Pennsylvania and Virginia were reviewed and categorized. A case-control study was performed to determine risk factors for human contact with ORV baits.
Results: Fifty-one persons reported contact, including 11 (26%) vaccine exposures. No vaccinia virus infections were detected. Ten (91%) persons reporting vaccine exposure found the ORV bait while with a pet dog. Multivariate analysis demonstrated that dog ownership (odds ratio [OR] = 3.4, 95% confidence interval [CI] = 1.8-5.1) a rural setting (OR = 2.8, CI = 1.1 – 5.6) and ground baiting (OR = 5.7, CI = 2.1-9.6) were associated with a higher risk of bait/vaccine contact.
Conclusions: Human vaccinia virus infection from ORV remains a rare event. Communication campaigns focused on preventing human contact with baits should be initiated at the start of ground baiting activities, and should target dog owners, especially in rural areas.

Vector-Borne Diseases

Poster No. 21
Human Babesiosis Caused by a Newly Described *Babesia* Organism — Washington State, 2002

Authors: ***Kathryn H. Lofy, MD, J. Hofmann, A. Limaye, S. Slemenda, N. Pieniazek, Division of Parasitic Diseases Biology and Diagnostic Section Team, B. Herwaldt***

Background: Babesiosis is a potentially fatal intraerythrocytic parasitic infection transmitted by tick vector or blood transfusion. In the United States, most cases of babesiosis are caused by *B. microti* and acquired in the Northeast. This report describes the clinical and laboratory features of a newly identified zoonotic *Babesia* organism in a western Washington resident. An 82-year-old asplenic man exposed daily to tick habitats was hospitalized in July 2002 with fever, hematuria, and acute renal failure; the level of parasitemia on his initial blood smear was 35%. He recovered clinically after 26 days of treatment with clindamycin and quinine.
Methods: To characterize the organism, indirect fluorescent antibody testing for antibodies to *B. microti, B. divergens,* and WA1 antigens was done, and the 18S ribosomal RNA gene was amplified by polymerase chain reaction (PCR) and sequenced.
Results: The patient's antibody titer to *B. divergens* rose from 1:64 at diagnosis to ≥1:4096 6 weeks later. Phylogenetic analysis showed that the organism was closely related to the bovine parasite, *B. divergens*, and secondarily to the deer parasite, *B. odocoilei*. *Babesia* DNA was detected by PCR in the patient's blood 8 weeks post therapy.
Conclusions: The patient was infected by a previously undescribed *Babesia* organism closely related to *B. divergens*. Detection of the organism by PCR months after therapy, despite clinical improvement, suggests he had a persistent, low-grade infection, a phenomenon described with other *Babesia* species. The public health importance of the organism, including its vector and reservoir host and the risk factors for infection, are not yet known. Health-care providers should be vigilant for cases of zoonotic infections caused by novel vector-borne pathogens.

Key words: babesia, babesiosis, *Babesia microti*, *Babesia divergens*, Washington State

Poster No. 22
Cute, Cuddly, and Potentially Deadly Prairie Dogs: A Near Miss with Tularemia

Authors: ***Swati B. Avashia, MD, J. Kool, C. Lindley, K. Hendricks, J. Petersen, M. Schriefer, K. Gage, L. Carter, J. Buck, M. Cetron, T. Demarcus, D. Kim, D. Dennis***

Background: Thousands of wild prairie dogs are captured annually in the United States and sold as pets. These animals can transmit zoonoses to humans through bites, scratches, and body fluids. In July 2002, tularemia caused a large prairie-dog die-off at a commercial Texas animal distributor. We investigated the outbreak's extent and its impact on exposed humans.
Methods: Using distributor records, we determined outbreak onset, estimated prairie-dog deaths, and traced distribution of potentially infected prairie dogs. Recalled and quarantined prairie dogs were tested. Exposed persons were interviewed and offered antimicrobial prophylaxis and serologic testing for tularemia.
Results: Approximately 3,600 prairie dogs passed through the Texas distributor in 2002 until shipments were halted on August 1. In July 2002, approximately 250 prairie dogs died compared with 25 during the previous 6 months. The outbreak probably originated in prairie dogs from a May-June harvest in South Dakota or Texas. Potentially infected prairie dogs were shipped from the Texas distributor to 10 U.S. states and 7 foreign countries. *Fransicella tularensis* type B was cultured from quarantined or recalled prairie dogs in Texas and one foreign country.
No human cases were identified. Acute- and convalescent-phase sera obtained from 9/19 exposed persons showed no acute infection. Of 19 exposed persons, 6 (32%) reported recent prairie-dog bites, 13 (67%) handled prairie dogs and/or cleaned cages barehanded, and 7 (37%) ate and/or drank without handwashing after contact with prairie dogs.
Conclusions: Despite poor personal protective measures by exposed persons, no human cases occurred in this outbreak. Nonetheless, this outbreak illustrates the potential for pet-to-human transmission of a serious infectious disease and the health risks posed by trade in wild-caught animals.

Key words: tularemia, zoonoses, animals, occupational health

Poster No. 23
Post-Epidemic West Nile Virus Serosurvey of Dogs and Cats — Louisiana, 2002

Authors: ***James C. Kile, DVM, CPH, MPH, N. Panella, C. Chow, N. Komar, A. MacNeil, M. Bunning***

Background: West Nile virus (WNV) is a public health threat and responsible for a meningoencephalitis epidemic in 2002 in St. Tammany Parish, Louisiana. After a similar epidemic in New York City in 1999, seroprevalence in dogs (approximately 10%) was fourfold greater than in humans, suggesting that domestic animals may be useful as sentinels for predicting risk to human beings. We sought to estimate WNV infection rates and assess environmental variables that correlate with seropositivity in dogs and cats.
Methods: We sampled dogs and cats presented to veterinary facilities (household) or animal control shelters (stray). Participating veterinarians obtained consent from owners, who completed a survey regarding their pets' environmental exposures. Environmental variables, such as household versus stray, were assessed. Serum samples (diluted 1:10) were screened for WNV using Plaque Reduction Neutralization Tests. Samples with ≥80% neutralizing antibody to WNV were considered flavivirus positive and further titrated to determine end point titers. Positive samples were also screened for St. Louis encephalitis virus (SLE). A fourfold or greater titer for WNV or SLE virus was considered diagnostic for that virus.
Results: Preliminary results indicate that 85 (27%) of 312 dogs and 11 (11%) of 99 cats were seropositive, ($\div^2$ p=0.002). Twenty-eight (37%) of 75 stray and 57 (24%) of 237 household dogs were seropositive, ($\div^2$ p=0.04).
Conclusions: The WNV seroprevalence in domestic dogs and cats in St. Tammany Parish in 2002 was higher than reported for New York City in 1999. Dogs have a higher WNV seroprevalence than cats. Stray dogs have a higher WNV seroprevalence than household dogs, suggesting increased environmental exposure. These data indicate the need for further evaluation of dogs and cats as sentinels.

Key words: West Nile virus, serosurvey, sentinel, plaque reduction neutralization test, environmental variables

Hepatitis C, HIV & Sexually Transmitted Diseases

Poster No. 24
High Rates of Enteric Illness in a Neighborhood with a High Proportion of Men Reporting Having Sex with Men — New York City, New York, 2001–2002

Authors: ***Melissa A. Marx, PhD, MPH, R. Dicker, M. Layton***

Background: Men who have sex with men (MSM) are known to be at increased risk for enteric infections from sexual exposures. We compared the incidence of enteric disease in adult males in a neighborhood with a high proportion of MSM (Neighborhood A: 35% MSM) with the incidence overall in New York City (NYC).
Methods: Cases of amebiasis, campylobacterosis, cryptosporidiosis, giardiasis, hepatitis A virus (HAV), and shigellosis are routinely reported to the NYC Department of Health and Mental Hygiene by laboratories and clinicians. Disease-specific incidence rates were calculated per 100,000 men aged ≥18 years for the 42 zip code-based neighborhoods of NYC, and Neighborhood A-specific incidence rates were compared with citywide incidence rates.
Results: Of 3690 reports received between August 2001 and July 2002, 43% (N=1585) occurred among males aged ≥18 years. Neighborhood A had the highest incidence of amebiasis, cryptosporidiosis, giardiasis, HAV and shigellosis and the third highest incidence of campylobacterosis of all neighborhoods. The incidence rates of all enteric pathogens were more than three times as high in Neighborhood A as the rest of the city (amebiasis=110.5 versus 12.0, Rate Ratio (RR)=9.2; 95% Confidence Interval (CI)=7.1-12.0; cryptosporidiosis=25.5 versus 3.1, RR=8.1; CI=4.7-14.0; giardiasis=212.5 versus 24.4, RR=8.7; CI=7.2-10.6; HAV=37.4 versus 8.4, RR=4.4; CI=2.9-6.9; shigellosis=22.1 versus 3.4, RR=6.5; CI=3.7-11.6; campylobacterosis=17.0 versus 5.2; RR=3.3; CI=1.7-6.2, respectively).
Conclusions: The incidence of enteric infections was significantly higher in a neighborhood with a high proportion of MSM than in the rest of the city. These data suggest that MSM-targeted sexually transmitted disease prevention messages should include messages regarding prevention of enteric infections in this population.

Key words: sexually transmitted diseases, communicable diseases, sex behavior, homosexual

Poster No. 25
Syphilis Knowledge and Safer Sex Education Among Men Who Have Sex with Men — New York City, New York, 2002

Authors: ***David Wong, MD, G. Paz-Bailey, L. Markowitz, S. Blank, J. Braxton, K. Fox***

Background: In NYC, primary and secondary syphilis cases in MSM have tripled since 2000, and an increasing proportion are diagnosed in private clinics. Syphilis is an indicator of risky sexual behavior and facilitates HIV transmission. STD knowledge and safer sex information may be lacking in this population.
Methods: During a 2002 syphilis case-control study in NYC, 298 MSM from public and private clinics were asked about syphilis knowledge and receipt of safer sex information. Knowledge scores for controls and information scores for all MSM were tabulated and categorized; characteristics of MSM with high and low scores were compared.
Results: Overall, the mean syphilis knowledge score was 9.9 (of 13), and the mean safer sex information score was 1.8 (of 4). Thirty-six percent of MSM attending public clinics were highly knowledgeable about syphilis (score ≥12), compared with 7% from private clinics (odds ratio [OR] 7.1, 95% confidence interval [CI]=3.0-16.7). Knowledge scores were similar across demographic groups. Whites (compared with non-whites) were less likely to have received safer sex information (OR 0.52, 95% CI=0.31-0.86), as were those with income ≥$20,000 (OR 0.51, 95% CI=0.30-0.86), and those with college education (OR 0.48, 95% CI=0.26-0.89). In stratified analyses, these findings were significant only among MSM attending private clinics. HIV serostatus and history of STD were not associated with knowledge and information scores.
Conclusions: MSM attending private clinics have less syphilis knowledge than those attending public clinics. Safer sex information in private clinics may be provided inconsistently, especially for MSM who are white or of higher socioeconomic status. Safer sex education and STD knowledge are important components of syphilis and HIV prevention and should be improved, particularly in private clinics.

Key words: safer sex education, syphilis, knowledge, MSM, clinic

Poster No. 26
Congenital Syphilis As An Outcome Measure of Syphilis Elimination — California, 1997-2001

Authors: ***Jan B. King, MD, MPH, M. Samuel, T. Lo, G. Gould, D. Gilson, S. Coulter, G. Bolan***

Background: Congenital syphilis (CS), a complication of infectious syphilis (IS) in pregnant women that causes stillbirths and mental retardation, is an outcome variable used to measure the success of CDC's Syphilis Elimination initiative. We assessed CS trends to evaluate California's progress toward syphilis elimination.
Methods: California surveillance data (1997—2001) for CS and syphilis in women of reproductive age were analyzed. These data included demographics and were collected through patient record reviews and interviews.
Results: During 1997—2001, CS cases decreased from 174 to 62. Rates of CS and IS in women of reproductive age decreased in African-American, white and Asian populations; although rates dropped among Latinos from 1997—1999, rates have remained level since 1999. In 2001, the highest number of cases of CS was among Latinos (45), followed by African Americans (10), whites (6) and Asian/Pacific Islanders (1). Case rates were highest for African Americans (32.3/100,000 live births) followed by Latinos (17.2), whites (3.6) and Asian/Pacific Islanders (1.7). The African American/white rate ratio (RR), a measure of racial disparity, decreased (RR[1997] = 17.1, 95% confidence interval [CI]=9.4-32.6, to RR[2001]=8.6, CI=12.8-28.8]). The Latino/white RR remained constant (RR[1997] =4.6, CI=2.7-8.6 to RR[2001]=4.8, CI=2.0-13.9). Preliminary analysis of 2001 data indicates 58% of Latino pregnant women with syphilis are foreign-born and 57% of those have been in the United States < 1 year.
Conclusions: Syphilis elimination activities in California have been successful overall in reducing CS cases, but less successful among Latinos. Data suggest importation may be associated with persistent disease incidence. Syphilis control efforts in California need to include immigrant-specific and binational initiatives to reduce endemic and imported sources of CS.

Key words: syphilis, California, sexually transmitted diseases, surveillance

Poster No. 27
Follow-Up of Patients Diagnosed with Hepatitis C Through an STD Clinic Screening Program — San Diego, California, 1999–2003

Authors: *Karen E. Mark, MD, P. Murray, D. Callahan, R. Gunn*

Background: Approximately 2.7 million Americans are chronically infected with hepatitis C virus (HCV). Without treatment and moderation/avoidance of alcohol, one-quarter will eventually develop liver cirrhosis or cancer. Because the majority of infected persons are asymptomatic until advanced liver disease develops, CDC recommends screening persons at risk for hepatitis C. However, data are limited regarding whether infected persons identified through screening programs access medical care or decrease alcohol consumption.
Methods: HCV-positive persons were identified through a San Diego sexually transmitted disease (STD) clinic screening program. Disease investigators informed clients of positive test results, provided education, and contacted each client by telephone 1, 3, 6, and ≥12 months later to assess medical care access and alcohol use, and to provide referral information as needed.
Results: From September 1, 1999–April 30, 2000, a total of 109 clients with newly diagnosed HCV were identified; 57 (52%) could be contacted ≥3 months after receipt of test results [median length (range) of follow-up 7 (3–17) months]. Of these 57, 30 (53%) had a medical evaluation, 9 (16%) received hepatitis A vaccination, 29 (51%) received hepatitis B vaccination, and 3 (5%) began hepatitis C treatment. Of 31 persons who reported drinking alcohol prior to diagnosis, 19 (61%) reported drinking less after diagnosis. Among those who did not obtain a medical evaluation, the most commonly reported reasons were lack of insurance, lack of time, and perceived unimportance.
Conclusions: Only about half of HCV-positive persons newly diagnosed through the STD clinic screening program obtained medical evaluation for hepatitis C, although many reported drinking less alcohol. Identifying ways to improve medical access for HCV-positive persons could improve the outcome of screening programs.

Key words: hepatitis C virus, prevention and control, screening, health services accessibility, alcohol drinking

Poster No. 28
Surveillance for Chlamydia in Women — South Carolina, 1998-2001

Authors: *Wayne A. Duffus, MD, PhD, D. Roberts, T. Stephens, L. Bell, J. Gibson*

Background: Chlamydia is the most commonly reported sexually transmitted disease in the United States, and the Southeast leads the nation in prevalence. Complications of untreated chlamydia infection include pelvic inflammatory disease (PID). South Carolina (SC) instituted statewide chlamydia screening and surveillance in 1998. We used surveillance data from the SC Department of Health and Environmental Control (DHEC) to determine chlamydia prevalence statewide.
Methods: Chlamydia testing was performed on all women aged ≤24 years who visited DHEC Family Planning and STD Clinics and on women aged ≥25 years who met screening criteria. Test positivity was used to calculate statewide prevalence and prevalence by age and ethnic group for 1998-2001. PID incidence during 1998-2001 was obtained from the Hospital Discharge and Outpatient Department Claims data set.
Results: Statewide chlamydia prevalence decreased from 9.5% in 1998 to 7.4% in 2001, while the number of tests performed increased from 52,414 to 68,103. Although the 10-14-year age group had the highest prevalence (12.9%, 1998; 11.3%, 2001), the 15-19-year age group represented the largest group of women with positive tests. Among African-American women, who had the highest prevalence by ethnic group, prevalence declined from 13.4% in 1998 to 10.4% in 2001. Incidence of PID during 1998-2001 for women aged ≤45 years declined from 4,250 cases in 1998 to 3,694 cases in 2001.
Conclusions: Chlamydia prevalence decreased in SC during 1998 to 2001 and was accompanied by a concurrent decrease in PID incidence. However, chlamydia prevalence remains high among young women aged 10-19 years and among African-American women. These groups should receive targeted prevention efforts.

Key words: chlamydia, women, South Carolina, population surveillance, prevalence

Poster No. 29
Heterosexually Acquired HIV in States With Integrated HIV/AIDS Surveillance — United States, 1999-2001

Authors: ***Lorena Espinoza, DDS, MPH, M. Saraiya, L.M. Lee, K. Glynn***

Background: Worldwide, most HIV infections result from heterosexual transmission and in the United States a growing proportion of cases are attributed to heterosexual contact. The purpose of this analysis is to describe the characteristics of adults and adolescents with a recent diagnosis of HIV infection acquired through heterosexual contact and to determine the proportion for whom diagnoses of HIV infection and AIDS were made simultaneously.
Methods: Using HIV cases reported from 29 states with name-based HIV/AIDS reporting, we examined new HIV diagnoses attributed to heterosexual contact from 1999 through 2001. We adjusted for reporting delays and anticipated reclassification of cases reported without a known mode of HIV exposure.
Results: A total of 77,553 cases of HIV infection were diagnosed during 1999-2001; of those 27,475 (35%) were acquired through heterosexual contact. By state, the percentage of diagnosed HIV infections attributed to heterosexual exposure ranged from 15% to 47%. Of persons whose infection was acquired through heterosexual contact, 17,698 (64%) were female. By race, 20,323 (74%) were non-Hispanic black, 4,062 (15%) were non-Hispanic white, and 2,561 (9%) were Hispanic. Among those with heterosexually acquired HIV infections, the diagnosis of HIV and the diagnosis of AIDS were made at the same time for 5,639 (21%) compared with 13,385 (27%) persons with other modes of transmission.
Discussion: Cases of HIV infection acquired through heterosexual contact constitute one third of all HIV cases, and most of the one third were in persons who were female and black. Prevention efforts and services should be focused on communities with the greatest need to reduce HIV infection acquired through heterosexual contact.

Key words: AIDS, HIV, heterosexual contact, prevention

Poster No. 30
Rapid HIV Testing and Antiretroviral Delivery for Women Without Antenatal Care — Thailand October 2000-September 2001

Authors: ***Michelle S. McConnell, MD, P. Amornwichet, A. Teeraratkul, R.J. Simonds, T. Naiwatanakul, N. Chantharojwong, M. Culnane, J. Tappero, S. Kanshana***

Background: Thailand's successful national program for preventing mother-child HIV transmission uses antenatal HIV testing and antenatal, intrapartum, and neonatal zidovudine. However, 12% of HIV-infected pregnant women receive no antenatal care (ANC). The Ministry of Public Health recommends rapid HIV tests for all women in labor who have not been tested and zidovudine for HIV-positive women. This analysis was to assess hospital practices in intrapartum testing and antiretroviral use for women without ANC.
Methods: Summary data (October 2000 through September 2001) on HIV testing and antiretroviral use were collected monthly from logbooks at 24 regional, 64 provincial, and 702 community hospitals throughout Thailand.
Results: By hospital type, the following proportions of women without ANC gave birth: 3,036 (2.9%) of 103,054 (regional); 5,491 (3.5%) of 159,146 (provincial); and 10,232 (3.3%) of 312,953 (community). Of women tested, those without ANC were significantly more likely than those with ANC to be HIV-positive (4% vs.1%, odds ratio [OR]=4.3, 95% confidence interval [CI]=4.01-4.66). The following proportions of women giving birth without ANC were tested during labor: 7,193 (80%) of 8,527 at regional and provincial hospitals and 6,153 (60%) of 10,232 at community hospitals (OR=3.6, 95% CI=3.33-3.84). At all types of hospitals, a total of 194 (24%) of 822 HIV-positive women without ANC received antiretroviral therapy.
Conclusions: Women without ANC were more likely than women with ANC to be HIV-positive. Larger proportions of women without ANC were tested at regional and provincial hospitals than at community hospitals. However, only 24% of HIV-positive women without ANC received antiretroviral therapy. The barriers to effective intrapartum HIV testing and antiretroviral use for women without ANC in Thailand should be determined and addressed.

Key words: HIV, Thailand, rapid HIV testing, prenatal care

Wednesday Session J
1:30-3:45p
The Early Years — Threats to Infant and Child Health
Moderator: Robert J. Berry

The Contribution of Selected Metabolic Diseases to Early Childhood Deaths — Virginia, 1996-2001
1:35pm

Authors: ***Mary M. Dott, MD, D. Chace, M. Fierro, T. Kalas, J. Williams, S. Rasmussen***

Background: Sudden infant death syndrome (SIDS) is the third most common cause of infant death in the United States; the etiology is unknown. Investigators have suggested that selected metabolic diseases might contribute to unexpected early childhood deaths, including SIDS. Screening for these diseases is currently being considered for addition to many newborn screening programs. We aimed to determine the contribution of selected metabolic diseases to unexpected deaths in early childhood using population-based methods.
Methods: The study population included all children less than 3 years of age who died during 1996-2001 and whose death was investigated by the Virginia Office of the Chief Medical Examiner (OCME). If tandem mass spectrometry metabolic disease screening results were not available, we sent dried blood to an independent reference laboratory for testing. To evaluate the association between a positive screen for selected metabolic diseases and demographic characteristics, Fisher's exact test was used to calculate risk ratios and 95% confidence intervals.
Results: We obtained screening results for 88% of the children examined by the OCME. Eight (1%) children had a positive screen for fatty acid oxidation disorders or organic acidemias. Race, age, and gender were not significantly associated with having a positive screen. One child died at 2 days of age and would not have benefited from identification in the newborn period. However, seven children's outcomes might have been improved had they been identified and treated.
Conclusions: Post-mortem metabolic screening may identify a cause of death for a substantial number of children and allow for early identification and treatment of affected siblings. If affected children are identified by newborn screening programs, effective therapies can be initiated and deaths may be prevented.

Key words: metabolism, inborn errors, spectrum analysis, neonatal screening, sudden infant death, cause of death

Widening of the Racial Gap in Feto-Infant Mortality — Georgia, 1980-1999: Does the Past Predict the Future?
1:55pm

Authors***: Kwame Asamoa, MD, MSc, W. Sappenfield, E. Khan, D. Casto,B. McCarthy***

Background: Georgia's feto-infant mortality rate (FIMR), the combination of fetal and infant deaths per 1,000 births, declined from 20.8 in 1980-1984 to 13.6 in 1995-1999. However, the black/white ratio increased from 2.0 to 2.4. Exploring reasons for the widening racial gap may suggest prevention strategies to reduce disparity.
Methods: We used linked birth and death certificate data for Georgia to examine FIMRs among black and white women for 1980-1984 and 1995-1999; births were restricted to ≥500grams and ≥20 weeks gestation. We calculated rates by selected characteristics, and used stratified analysis to estimate FIMR changes over time and the impact of population changes.
Results: FIMRs declined overall by 41.2% for white women and 29.5% for black women. Declines were greater for white than black women in all age/educational groups. Declines among white and black women, respectively, were 31.8% and 26.8% (teens <20 years), 34.0%and 21.1% (adults with <13 years of education), and 45.5% and 36.6% (adults with ≥13years of education). FIMR declines were greater for white than black women for most birthweight and age-at-death categories. Of note, 70% of the excess FIMR among black women in 1995-1999 was attributed to feto-infant deaths weighing less than 1,500 grams at birth. Decreases to the percentage of births to teens accounted for 13.7% and 12.3% of the FIMR decline among white and black women respectively. However, the percentage of teen births in 1995-1999 among black women (23.6%) remained higher than that of white women (13.0%).
Conclusions: The racial gap in Georgia's FIMR widened across maternal groups and types of death. To reduce Georgia's FIMR and the racial gap, we must prevent prematurity and teen pregnancy while promoting higher education among black women.

Key words: health, disparities, fetal, infant, mortality

Changing Risk Factors for Infant Mortality — Delaware, 1994–2000

2:15pm

Authors: *Marci L. Drees, MD, DTM&H, C. Ferre, M. Reynolds, L. Schieve*

Background: Healthy People 2010 aims to reduce infant mortality rates (IMR) to a target of 4.5 per 1,000 live births. After a decade of declining IMRs, Delaware noted an increase beginning in the late 1990s. Delaware now ranks seventh highest nationally for infant mortality.
Methods: We analyzed data from the linked birth-death certificate database from 1989–2000 using 3-year moving averages. We performed stratified analyses to examine IMR trends within infant birthweight and plurality subgroups and according to maternal characteristics.
Results: Delaware's IMR decreased from 11.6 (per 1,000 live births) during 1989–1991 to 7.1 during 1994–1996; IMR then increased to 8.7 during 1998–2000. Examination of birthweight-specific mortality revealed that the increase was limited to infants born with very low birthweight (VLBW: <1500 g). From 1994–1996 to 1998–2000, the IMR increased from 235 per 1,000 to 294 per 1,000 in this group (p=0.03). The increase was greatest for VLBW twins and triplets and less for VLBW singletons. Additional stratification on maternal factors revealed that the increases were highest among infants whose mothers were aged at least 30 years, married, privately insured, resided in suburban New Castle County, and who had at least a high school education and initiated prenatal care in the first trimester.
Conclusions: Delaware's increase in infant mortality appears to be primarily related to increasing mortality among VLBW infants. The risk factors associated with this increase suggest that deaths of infants born to women from higher socioeconomic groups are the primary contributors to Delaware's increase in infant mortality. Further investigation is needed to determine the underlying factors related to increased risk and the interventions required to prevent infant deaths.

Key words: infant mortality, infant, low birth weight, pregnancy, multiple, risk factor, socioeconomic factors

Folic Acid Supplements During Pregnancy and Infant Mortality — People's Republic of China, 1993-2002

2:35pm

Authors: *Lorraine F. Yeung, MD, MPH, J. Liu, J. Gindler, H. Wang, R. Berry, Z. Li, J. Zheng*

Background: Periconceptional use of folic acid (FA) reduces a woman's chance of having a pregnancy affected by a neural tube defect (NTD). Since 1992, such use has been recommended in the United States. However, few studies have evaluated other health effects among children whose mothers took FA during early pregnancy. A recent FA supplementation program to prevent NTDs in China provided an opportunity to study the relationship between maternal use of FA supplements during early pregnancy and subsequent infant mortality.
Methods: We established prospective follow-up of women who had a premarital examination and who delivered a singleton, live-born child, and determined the number of these children who had died during infancy. Among women who did and did not take 400 mcg of FA before and during early pregnancy, we calculated infant and postneonatal mortality rates (IMR and PNNMR) and used multivariate analyses to adjust for sex, geographical location, and presence of birth defects.
Results: In this population-based study of 131,564 infants, 1342 infant deaths occurred (10.2/1000 live births). Among the infants of the 106,358 women who took FA and 25,206 women who did not take FA, the IMRs were 10.0 and 11.1, respectively (RR = 0.90, 95% CI = 0.79-1.02), and the PNNMRs were 2.5 and 3.3, respectively (RR = 0.75, % CI = 0.59-0.96). Adjusting for potential confounders did not change these results.
Conclusions: In this population-based study, we found a lower risk of postneonatal mortality among infants whose mothers took FA supplements during early pregnancy. However, because FA pill-taking did not occur during the second and third trimesters, such a FA effect on infant mortality would occur before or during the first trimester.

Key words: pregnancy, prevention research, nutrition, folic acid

Trends in Sepsis-Related Neonatal Mortality — United States, 1985-1998

2:55pm

Authors: ***Susan L. Lukacs, DO, MSPH, K. Schoendorf, A. Schuchat***

Background: Each year in the U.S. up to 32,000 newborns develop sepsis, a life-threatening infection. In the 1990s, intrapartum antibiotic prophylaxis (IAP) was recommended to prevent maternal-infant transmission of Group B Streptococcus (GBS), the leading cause of early-onset (<7 days) sepsis. Since IAP use, early-onset GBS disease declined 70%, however, increased antibiotic use associated with IAP might lead to more severe or resistant forms of sepsis. We evaluated sepsis neonatal mortality as an indicator of life-threatening infection before and after IAP recommendations.
Methods: Using the National Center for Health Statistic's Linked Birth/Infant Death Datasets, we compared trends in sepsis-related early (< 7 days), late (7-27 days) and total (<28 days) neonatal mortality among singleton, U.S. births from 1985-1991, pre-IAP recommendations, to 1995-1998, post-IAP. To compare trends between the two time-periods we estimated annual percent change in mortality using log-linear regression and stratified by gestational age.
Results: Average annual neonatal mortality from sepsis was 38.9/100,000 live births pre-IAP compared to 31.0/100,000 live births post-IAP. Early neonatal mortality declined more steeply since IAP recommendations, 5.6% annually post-IAP vs. 3.2% pre-IAP (p=0.05). Late neonatal mortality concomitantly increased, 4.3% annual increase post-IAP vs. 0.6% decline pre-IAP (p=0.61). Declining early neonatal mortality was most prominent in term infants whereas increased late neonatal mortality was most prominent in very preterm infants.
Conclusions: Declines during 1995-1998 in sepsis-related early neonatal mortality may be attributable to prevention of GBS disease through IAP and support continuing IAP for GBS-colonized women. Increasing late neonatal mortality may be due to postponed deaths among early-onset sepsis cases or increased mortality in late-onset sepsis. More detailed investigation for re-emergence of non-GBS pathogens and antibiotic resistance would be informative.

Key words: sepsis, neonatal mortality, antibiotic prophylaxis, Group B Streptococcus

Use of Active Hospital Surveillance to Validate Estimates of Rotavirus Hospitalizations in Children — Cincinnati, Ohio 2000-2001

3:15pm

Authors: ***Vincent P. Hsu, MD, MPH, M. Staat, N. Roberts, C. Thieman, J. Bresee, R. Glass, D. Bernstein, U. Parashar***

Background: National estimates of hospitalizations for rotavirus (RV), the leading cause of severe acute gastroenteritis (AGE) in US children, have been used to establish the need for vaccines. Previous estimates derived from hospital discharge data have not been validated. Our study utilized prospective active surveillance of RV detection in children hospitalized with AGE to validate RV hospitalization estimates and to evaluate the sensitivity of the RV code.
Methods: We compared data from Cincinnati Children's Hospital Medical Center on hospital discharges for AGE and RV during 2000-2001 with data on laboratory-confirmed cases of RV from the active surveillance group or the hospital laboratory. Among children discharged with AGE, we estimated additional RV hospitalizations by extrapolating the proportion of RV-positive results from those enrolled in active surveillance to those not enrolled and not tested for RV.
Results: Of 767 AGE discharges, 103 (13%) were RV-coded, and 91% (94/103) of those were laboratory-confirmed. Among all AGE discharges, 260 (34%) were enrolled in active surveillance, and 155 of them (60%) tested positive for RV. With an additional 47 RV positives from the hospital laboratory, a total of 202 patients had laboratory-confirmed RV, yielding a maximum sensitivity of the RV code of 47% (94/202) and a predictive value positive of 97%. Extrapolation calculations indicated that up to an additional 227 untested children might be RV-positive, yielding a total of 429 RV hospitalizations and a minimum sensitivity of the RV code of 22% (94/429).
Conclusions: Measurement of RV-coded hospital discharges alone greatly underestimates the true burden of RV-associated hospitalizations. Therefore, the national burden of RV hospitalizations, and thus the potential benefits of RV vaccination, may be greater than previously estimated.

Key words: rotavirus infections, hospitalization, burden of illness

Wednesday Special Session L: International Night 7:30-9:45p

Evidence-Based Decision-Making in International Health — A Tool to Increase Impact

Moderator: Eugene J. Gangarosa

Sponsored by the Training in Epidemiology and Public Health Interventions Network (TEPHINET)

Methemoglobinemia Secondary to Chemical Poisoning Among Scavengers of a Suburban Dumpsite — Philippines, 2002

7:35pm

Authors: *Elmer N. Ocampo[1], RN, C Alib[1], E. Bontuyan Jr.[1], A. Garfin[1], J. Navarro, J. Lopez Jr.[1], M. Lim-Quizon[1], A. Francisco[2], V. Antonio[3]*

1 Field Epidemiology Training Program, NEC, DOH, Philippines
2 Environmental and Occupational Health Office, Department of Health, Philippines
3 Toxicology Department, East Avenue Medical Center

Background: On March 26, 2002, we received a report of chemical poisoning among scavengers at a suburban dumpsite. A multi-agency team was sent to investigate and determine the cause.
Methods: A descriptive study was done. A case was an instance of chemical poisoning affecting a previously well scavenger who suddenly developed the following signs and symptoms: headache, yellowish discoloration of hands and feet, cyanosis, dizziness, vomiting, and nausea. Blood samples were collected for toxicological analysis, and chemical samples were collected for identification and analysis. The dumpsite was visited, and key informants were interviewed.
Results: Fifty-one drums of various textile dyes were discarded at the dumpsite on March 25, 2002. The following day, 52 persons were hospitalized for suspected chemical poisoning. There were no deaths. Ages ranged from 3 to 77 years (median 15). Forty (77%) were males; incubation period ranged from 30 minutes to 29 hours (median 2 hours). The most common symptom was yellowish discoloration of hands and feet. Analysis of blood samples showed elevated methemoglobin levels. Thirteen of the drums were emptied and salvaged by scavengers – six had contained Brentamine Red, six had contained Fast Red Salt, and one was unlabelled.
Discussion: The chemical poison that caused this incident was Brentamine Red. The yellow powdered chemical contains para-nitroaniline and nitrous oxide, which can induce methemoglobinemia. This chemical is rapidly absorbed through the skin and fatal if swallowed or inhaled. Prolonged exposure can cause liver damage. Although the use and disposal of industrial-grade hazardous chemicals are regulated, these regulations are not always enforced. Health authorities are looking at the long-term effects of the chemical spillage. Guidelines on proper disposal of hazardous chemicals are being enforced to prevent similar incidents.

Key words: Para-nitroaniline, Nitrous oxide, Methemoglobinemia

Factors Influencing Participation in Voluntary Counseling and Testing for the Prevention of Parent to Child Transmission of HIV in Women — Zimbabwe 2002

7:55pm

Authors: *Linnetie Mugore[1,2], MPH, BPharm, M. Tshimanga [2,3], S. Laver [2], D. Jones[2]*

1 Ministry of Health and Child Welfare, Mashonaland East Province, Zimbabwe
2 University of Zimbabwe, Department of Community Medicine.
3 Health studies Office, Ministry of Health and Child Welfare, Zimbabwe.

Background: The high prevalence of HIV among pregnant women in Zimbabwe (35%) has necessitated the institution of Prevention of Mother-to-Child Transmission (PMTCT) programs. A pilot program in Epworth found that only 36% of eligible pregnant women agreed to participate and accept voluntary counseling and testing (VCT). Understanding the factors contributing to participation in the program is critical to stopping pediatric HIV among children in Zimbabwe.
Methods: An unmatched case-control study was carried out at Epworth Polyclinic, Mashonaland East Province, Zimbabwe. All women whose babies had been delivered at Epworth Polyclinic between 10 June and 5 July 2002 were eligible for the study. Case-patients were defined as those new mothers who had accepted HIV testing during the recent pregnancy; controls were new mothers who had not had HIV testing. The association between accepting an HIV test, demographics, knowledge, practices, beliefs, and norms about HIV testing for PMTCT was examined.
Results: The study group included 51 case-patients and 102 controls. Most variables related to demographics and knowledge were not associated with HIV testing. Having an HIV test before the most recent pregnancy [OR=3.8, 95% CI =1.4-10.3], saying that she would determine whether she takes an HIV test [OR=26, 95%CI =7.0-113], and stating that she could still take an HIV test even if her husband did not approve [OR=8.9, 95%CI (3.4; 25)] were all associated with HIV testing. Saying that her community would shun her if she is found to be HIV positive [OR=0.23, 95%CI =0.09-0.54], saying that her husband would be upset if she had an HIV test [OR=0.14, 95%CI=0.05-0.34], and saying that her husband opposed her taking an HIV test for PMTCT [OR=0.11, 95%CI (0.04; 0.28)] were significantly associated with not testing.
Conclusion: The husband was the most significant influence on a woman's testing behaviour. Programs to promote PMTCT have now developed strategies to target couples rather than just pregnant women.

Key words: HIV prevention, Voluntary Counseling and Testing (VCT), antenatal care, pregnancy, disease transmission, vertical

Coagulopathy-Related Deaths Associated with Endotoxin-Contaminated Parenteral Solutions — Pernambuco, Brazil, 2002

8:15pm

Authors: *Luciane Z. Daufenbach[1], RN, W. Alves[1], E.Carmo[2], Z. Wanderley[3], J. Azevedo[3], M. Elisbão[3], R. Vasconcelos[3], O. Silva[3], L. Silva[3], R. Silva[4], M.J. Arduino[5], T. Forster[5], D.L. Hatch[5]*

1 Field Epidemiology Training Program (EPI-SUS), National Epidemiology Center (CENEPI), National Health Foundation (FUNASA), Ministry of Health-Brazil (MoH)
2 CENEPI, FUNASA, MoH
3 Health Secretariat, Pernambuco State, Brazil
4 Oswaldo Cruz Foundation (FIOCRUZ), Brazil
5 Centers for Disease Control and Prevention (CDC), Atlanta, USA

Background: Pyrogenic reactions are common following the receipt of intravenous fluids contaminated by bacterial endotoxin, and high endotoxin concentrations may cause hypotension and/or disseminated intravascular coagulation. After two patients died from severe hemorrhage after elective surgery at one hospital in Pernambuco State, Brazil, an investigation was conducted to determine the cause.
Methods: Active case-finding was conducted at five hospitals to identify possible adverse reactions among patients, defined as one or more of the following symptoms occurring between February 1-March 15, 2002, within 12 hours after receiving intravenous fluid(s): fever, chills, or hemorrhage with thrombocytopenia with prolonged prothrombin and/or partial thromboplastin time. Unopened flasks of intravenous fluids were sent for microbial culture, and *Limulus* lysate assay was used to measure endotoxin concentrations.
Results: Twenty-seven (8%) of 355 patients at five hospitals had adverse reactions; five (19%) died. At Hospital A, four (57%) of seven case-patients with disseminated intravascular coagulation died; 100% (7/7) had received intravenous ringers lactate solution produced by the same company (Company A). High endotoxin concentrations were identified in unopened flasks of implicated lots of ringers lactate: mean=88.3 endotoxin units [EU]/mL, range: 9.7-298.0. Bacterial cultures were negative. Metronidazole from Company A was also linked to pyrogenic reactions at Hospital B; testing of implicated lots showed endotoxin contamination (mean concentration=28.3 [EU]/mL, range: 5.0-58.3]. Following a recall of Company A's products, no additional case-patients were identified.
Conclusions: Brazilian manufacturers routinely conduct quality control testing to identify endotoxin contamination of intravenous solutions, but this outbreak was first identified by state-level surveillance. As a result of this investigation, Pernambuco State has implemented routine quality-control testing of randomly selected lots of parenteral solutions to assure a safe supply for hospitals.

Key words: Bacterial endotoxin, disseminated intravascular coagulation (DIC), pyrogenic reactions, intravenous solutions

Population-Based Surveillance of Typhoid Fever — Egypt, 2002

8:35pm

Authors: *Padmini Srikantiah, MD, F.G. Youssef, G. Jennings, M. Wasfy, I. El Refaee, M. Anwar, S.P. Luby, F.J. Mahoney*

Background: Typhoid fever causes an estimated 400,000 deaths annually worldwide. Credible measures of disease incidence are necessary to guide prevention efforts, especially with the advent of new typhoid vaccines. In Egypt, incidence estimates of 15/100,000 persons/year are derived largely from hospital-based syndromic surveillance, which may not represent the population with typhoid.
Methods: To determine the population-based incidence of typhoid fever in Fayoum Governorate (pop 2,240,000), we established laboratory-based surveillance during a 4-month study period at five tiers of health providers: 1 fever hospital, 6 district hospitals, 16 fever specialists, 13 (10%) of 135 rural health units, and 18 (10%) of 186 primary care providers. Health providers were trained to collect blood for culture and serology. Incidence estimates were adjusted for sampling, test sensitivity, and seasonality. Antimicrobial susceptibility testing was performed on *Salmonella* Typhi isolates.
Results: 1770 patients were evaluated. Blood cultures yielded 87 (5%) *Salmonella* Typhi isolates. The estimated incidence of typhoid is 58/100,000 persons/year. Using rates of positive culture and source of care, we estimate 71% of typhoid patients are managed by primary care providers. Multi-drug resistant (MDR) typhoid (resistance to chloroamphenicol, ampicillin, trimethoprim-sulfamethoxazole) was diagnosed in 23 (26%) patients. Brucellosis was diagnosed by culture and serology in 140 (8%) patients. Over half (56%) of brucellosis patients were clinically diagnosed with typhoid and received inappropriate antimicrobial therapy.
Conclusions: In Fayoum, the incidence of typhoid fever and brucellosis are high. The highest proportion of typhoid patients are evaluated at the primary care level, and would be missed by hospital-based surveillance. The prevalence of MDR typhoid and frequent misdiagnosis of brucellosis highlight the need to develop simple guidelines for diagnosis and treatment of acute febrile illness.

Key words: *Salmonella* Typhi, typhoid fever, Egypt, surveillance, brucellosis, incidence

Injection Safety — Chongqing, China, 2002
8:55pm

Authors: *Li Qin[1], MD, J.M. Ou[1], G. Zeng[1]*
1 Chinese Field Epidemiology Training Program (CFETP), China CDC, Beijing, China

Background: Worldwide, unsafe injection practices are increasingly recognized as an important contributor to bloodborne diseases transmission. In China, limited data are available, especially for the curative setting, regarding the frequency and determinants of unsafe injections.
Methods: We used multistage probability sampling to select a sample of 35 health-care facilities (HCF) including 4 county and 10 township hospitals, 12 village and 9 private clinics from 240 HCF. 91 health care providers from the 35 HCF were selected randomly to conduct a knowledge, attitudes and practices survey. 199 village residents from 10 villages (20 from each village) served by the 35 HCF were selected to conduct a household survey.
Results: 34% (SE=8.0%) of HCF used only disposable syringes, 5.7% (SE=3.9%) used only reusable syringes, and 60% (SE=8.3%) used a mixture. Changing needles but not syringes between patients for subcutaneous/intramuscular injections were observed at 30% (SE=9.6%) of HCF. The same practice was observed at all 8 facilities giving intradermal allergy injections. A total of 63% (SE=8.4%) of facilities discarded used syringes without any disinfection along with regular waste; 48% (SE=10%) of HCF used common pots and 52% (SE=10%) used high pressure steam pots to sterilize reusable syringes. A total of 33% (SE=14%) of the HCF using common pots sterilized the reusable syringes once a week or once a month; 73% (SE=13%) of the HCF using high pressure steam pots sterilized the reusable syringes once a month. 25% (SE=4.6%) and 40% (SE=5.1%) of health-care providers did not know unsafe injections could transmit hepatitis B or HIV, respectively. Sixteen percent (SE=4.0%) of the health-care providers reported having a needle-stick injury during the last year; 62% (SE=13%) of the last needle-stick injuries happened when they were destroying the used disposable syringes. Twenty-nine percent (SE=3.2%) of the villagers received at least 1 injection during last 3 months. The number of injections per person per 3 months was 0.84 (SE=0.14). 41% (SE=3.7%) of villagers preferred an injection treatment if they had fever, and 92% (SE=2.0%) and 87% (SE=2.5%) did not know that unsafe injections could transmit hepatitis B or HIV, respectively.
Conclusions: Inadequate injection practices and limited knowledge regarding safe injection practices were found among residents and providers in Chongqing. Given the high prevalence of bloodborne (e.g., hepatitis B) diseases in China, improving knowledge and practices regarding injection safety and improving syringe disposal management should be high priorities.

Key words: injection safety, disposable equipment, syringe, cross sectional investigation

Outbreak of Aseptic Peritonitis Among Peritoneal Dialysis Patients Associated with the Use of Icodextrin — Extremadura, Spain, January-April 2002
9:15pm

Authors: *Ulrike Dürr[1,2], MD, A. Martínez Salvador[2], J.M. Ramos Aceitero[3], F. Martínez Navarro[2,4], D. Herrera Guilbert[2,4]*
1 EPIET, Instituto Carlos III, Madrid, Spain
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4 Instituto Carlos III, Madrid, Spain

Background: From March to April 2002, one hospital in the Extremadura region reported an increased number of aseptic peritonitis in patients with renal failure receiving ambulatory peritoneal dialysis. In this population peritonitis produces serious complications, high rate of technique failure, 10% of these patients die.
Methods: A retrospective cohort study was conducted among all 47 peritoneal dialysis patients followed up from 01/01/02-04/30/02 in Extremadura. A confirmed case involved any patient who had culture-negative peritoneal fluid, a white blood cell count >90/mm^3, and cloudy peritoneal fluid or abdominal pain. Data on potential risk factors (underlying diseases, treatment, recurrent peritonitis, modes of dialysis) were collected from hospital records and interviews with patients and medical staff. Dialysis fluids were assayed for chemical contamination, endotoxins, peptidoglycans, or b-glucan.
Results: All 47 patients were included in the cohort; seven (15%) had sterile peritonitis. The only exposure associated with peritonitis was icodextrin (relative risk [RR] undefined, p=0.024), an osmotic agent used to increase ultrafiltration and produced by a single manufacturer. Patients who had been exposed to three specific lots were more likely to develop peritonitis than those not non-exposed (RR undefined, p=0.028). Laboratory analysis showed these lots were contaminated with major levels of peptidoglycans.
Conclusions: Contamination of icodextrin caused this outbreak. Since patients in Extremadura stopped using icodextrin, no additional episodes occurred. After national health authorities were alerted, 55 more episodes and 22 other contaminated lots were identified. One month later (five months after the first episode in Extremadura), the manufacturer recalled these lots and other lots in other countries. Because icodextrin is distributed worldwide, the extent of the outbreak remains unknown. We recommend to reduce intervention delay by improving the traceability of dialysis fluids networking among dialysis centers, and networking within and among health systems.

Key words: outbreak, home peritoneal dialysis, peritonitis, icodextrin, retrospective cohort

Thursday Morning, April 3, 2003
Session M
8:30-10:00a
Rafts, Tubs, and Rubs — Leisure-Associated Illness
Moderator: Paul V. Effler

Outbreak of Gastrointestinal Illness Among Grand Canyon River Rafters — Grand Canyon, Arizona, June 2002
8:35am

Authors: ***James A. Mullins, DVM, MPH, J. Sarisky, P. Downs, A. Patel, S. Monroe, M.A. Widdowson***

Background: Noroviruses are the leading cause of acute gastroenteritis in the United States and are usually transmitted by contaminated food or directly from person to person. Transmission from contaminated water supplies has been documented, but rarely from large bodies of water. In June 2002, an outbreak of gastrointestinal illness occurred among river rafters on the Colorado River in Grand Canyon, AZ. The objective of this investigation was to determine the agent, source, and risk factors for illness.
Methods: We conducted a retrospective cohort study of all rafting trips that launched between May 26 and June 2, 2002. Trip leaders were surveyed for information on occurrence of gastroenteritis among passengers or crew, raft itineraries, food handling practices, and water processing procedures. Stool specimens and river water samples were tested for noroviruses by using reverse transcription-polymerase chain reaction assays.
Results: Of 42 rafting trips surveyed, 32 (76%) responded. Seven (22%) of these were classified as "ill trips" (three or more passengers or crew with symptoms of vomiting or diarrhea). Of 201 participants of ill trips, 52 (26%) reported gastroenteritis. Location of illness onset was evenly distributed along the river. Illness occurred in five of 11 oar-powered trips compared with two of 21 motor-powered trips (risk ratio [RR]=4.7, p=.03). All seven ill trips used river water as their primary water source (RR=undefined, p=.10). Stool specimens from portable toilets of two different ill trips and two river water samples tested positive for noroviruses.
Conclusion: This outbreak appears to have been associated with drinking river water contaminated with noroviruses. Rafters should strictly follow guidelines for handling and disinfecting drinking water. Identification of possible sources of noroviruses contaminating the Colorado River is warranted.

Key words: gastroenteritis, vomiting, diarrhea

Outbreak of Pontiac Fever Among Guests at a Hotel — Illinois, 2002
8:55am

Authors: ***Gregory D. Huhn, MD, MPH&TM, B. Adam, R. Ruden, L. Hilliard, P. Kirkpatrick, J. Todd, W. Crafts, D. Passaro, M. Dworkin***

Background: Recreational waterborne-disease outbreaks in the United States are increasing. Bathing in hotel whirlpool spas has been associated with several outbreaks of Pontiac fever (PF), a manifestation of legionellosis with influenza-like symptoms with high attack rates. Thirty-one persons staying at an Illinois hotel during August 9-11, 2002, reported influenza-like symptoms to local health departments within 24-48 hours of checkout. We investigated to identify the cause and source of illness and guide control measures.
Methods: Hotel water samples were collected for culture. A telephone questionnaire detailing illness symptoms and exposures was administered to all August 9-15 hotel guests (n=380). A case was defined as onset of fever or onset of headaches plus myalgias within 2 weeks after hotel stay. Case-patient sera were tested by hemagglutination assay for antibodies to *Legionella* species.
Results: Among 204 questionnaire respondents, 67 met the case definition. Among persons exposed to the enclosed swimming pool/whirlpool spa area, 67% (60/89) became ill versus 6% (7/114) of unexposed persons (relative risk=11.0, 95% CI=5.3-22.8). Illness risk increased with increasing pool/spa exposure time. Approximately 95-115 bathers/day, two-three times above usual, used the spa during August 9-11. *Legionella dumoffii, L. maceachernii*, and *L. micdadei* were isolated from spa filter backwash cultures. Two of 15 ill persons with acute- and convalescent-phase sera had a fourfold rise in antibody titer to *L. micdadei*.
Conclusions: Exposure to a crowded hotel pool/spa area was associated with an illness compatible with PF. Heavy bather usage likely contributed to decreased disinfectant effectiveness in the whirlpool spa, possibly promoting bacterial aerosolization. High spa bather load has been noted in other PF outbreaks. Restrictions on the number of bathers might help prevent disease transmission.

Key words: legionellosis, Pontiac fever, whirlpool spa, hotel, bather load, recreational waterborne-disease

Come Sail Away: Cruise Related Illness — Caribbean, 2002
9:15am

Authors: ***Jennifer G. Wright, DVM, MPH, V. Hsu, S. Bulens, M. O'Brien, S. Monroe, R. Beard, E. Cramer, M. Widdowson***

Background: By December 2, 2002, 21 outbreaks of acute gastroenteritis (AGE) on board cruise ships were reported to CDC, three times the number reported in 2001. On October 1, 2002, cruise ship C reported 54 (2.7%) of 1984 passengers had presented to the ship's infirmary with symptoms of AGE. CDC conducted an investigation to determine the etiology and source of the outbreak and to implement outbreak-control measures.
Methods: Passengers and crew members were surveyed for illness and exposures. We defined a case of AGE as a person with three or more episodes of diarrhea or any vomiting. A case-control study was conducted with 90 passengers reporting AGE onset September 28 through 30 and 151 passengers without AGE. Stool samples from ill passengers were tested for noroviruses by reverse transcriptase-polymerase chain reaction (RT-PCR) with subsequent sequencing of PCR amplification products.
Results: Of 1897 (96%) passengers returning a survey, 356 (19%) met the case definition. Of 90 ill passengers, 80 (89%) attended the embarkation lunch compared with 116 (77%) of 151 controls (odds ratio 2.41, 95% confidence interval 1.13, 5.15). Four of 11 stools were positive for norovirus by RT-PCR. Amplification products from three of the positive samples had an identical sequence. Partial capsid sequencing suggested the strain in these three samples comprised a previously unrecognized genetic cluster of noroviruses. The strain in the fourth norovirus-positive stool sample was different and classified in a known cluster (GII/4).
Conclusions: Foodborne transmission may have started this outbreak of norovirus-associated AGE. After heightened disinfection measures were implemented, AGE reports declined to baseline rates. This outbreak highlights the need for rapid implementation of outbreak-control measures and further study of noroviruses.

Key words: Norovirus, Norwalk-like virus, ships, travel, gastroenteritis

Outbreak of Pseudomonas Folliculitis Associated with a Body Wrap Salon — Colorado, 2001
9:35am

Authors: ***Alicia B. Cronquist, MPH, K. Gershman, K. Meyer-Lee, A. LeBailly***

Background: Body wraps are increasingly popular, yet unregulated, weight loss treatments in which clients are tightly wrapped in elastic bandages soaked in a mineral solution. In February 2002, a salon owner reported a cluster of pustular rashes among wrap clients. We investigated to determine the extent and etiology of the outbreak.
Methods: A case-patient was a person with a pustular rash on the torso, arms or legs with onset 24–72 hours after a wrap at salon A, during September 2001–February 2002. We found cases by examining salon records and faxing letters to area physicians. Controls were clients without rash who were wrapped on the same day as case-patients. Environmental cultures were obtained from salon A.
Results: We identified 10 case-patients and 16 controls. The estimated attack rate for January–February was 2.0%–2.7%. All patients were identified through salon records and shared no exposure except the salon. Mean case-patient age was 35 years (range 26–49). Patients and controls were all female, and were similar in age, mean hours between wrap and showering, type of wrap received, prior medical conditions, and recent swimming or spa use. *Pseudomonas aeruginosa* was isolated from two patients' rashes, three bottles of wrap solution, and elastic bandages that had been reused for 7 months with inadequate cleaning and that were routinely stored damp. Contaminated wrap solution was sprayed ad lib on "fatty" areas.
Conclusions: This is the first reported folliculitis outbreak associated with a body wrap salon. Individual risk factors for infection were not identified. Inadequate sanitary practices provided a warm, moist environment, ideal for *Pseudomonas* growth. This investigation highlights the need for stricter wrap salon guidelines.

Key words: disease outbreaks, *Pseudomonas aeroginosa*, folliculitis, contamination

Thursday Session N
10:30a-12:15p
It's No Accident — Unintentional and Intentional Injuries
Moderator: Lynda S. Doll

Fatal Collisions with Trail Gates Among Drivers of Off-Highway Recreational Vehicles — New Hampshire, 1991-2002
10:35am

Authors: ***Leigh T. Ramsey, PhD, MS, A. Pelletier, T. Andrew, T. Acerno, P. Gray***

Background: Unintentional injuries are the leading cause of death for persons aged 1–35 years. Off-highway recreational vehicles (OHRV) are popular in New Hampshire, with >80,000 registered in 2001. In 2002, three fatalities occurred on New Hampshire trails when children driving OHRV collided with trail gates (horizontal steel pipes on posts 3 feet high) designed to keep cars off trails. We conducted a study to determine the extent of the problem and characteristics of the fatal events.
Methods: A case was defined as the death of a person on an OHRV that collided with a trail gate in New Hampshire during 1991–2002. We identified cases by reviewing New Hampshire Fish and Game Department reports and newspaper accounts.
Results: We identified seven deaths; each death involved the OHRV driver. Two drivers died from cervical spine injuries, and five died from massive chest and/or abdominal trauma. Six of the deaths were males, and four were persons aged ≤17 years (age range: 12–31 years). Of the three adults who died, two were intoxicated and the third was speeding. One death occurred on an all-terrain vehicle (ATV), three on motorbikes, and three on snowmobiles. Five deaths occurred on one trail. Three deaths occurred on trails closed to motorbikes and ATVs. Five fatal collisions occurred after dark, when trail use is prohibited.
Conclusions: Fatal OHRV collisions with trail gates occurred most frequently among males who were young drivers or breaking trail rules. Efforts to prevent trail gate collisions should focus on increased enforcement of OHRV operating rules, driver education, enhanced gate visibility, and improved signage.

Key words: off-highway recreational vehicles, fatality, trail gates, unintentional injury

Surveillance of Community–Acquired Adverse Drug Events — A Pilot Study Using the National Electronic Injury Surveillance System
10:55am

Authors: ***Daniel S. Budnitz, MD, MPH, D. Pollock, S. Elbert, L. Annest, A. McDonald***

Background: Shortcomings in the quality of Adverse Drug Event (ADE) surveillance in the U.S. have prompted recommendations from the Institute of Medicine and Congressional General Accounting Office to improve methods of ADE surveillance. We implemented a pilot study to determine the feasibility of using the National Electronic Injury Surveillance System–All Injury Program (NEISS-AIP) for active surveillance of acute, community–acquired ADEs.
Methods: NEISS-AIP uses medical chart review to rapidly report injuries treated in a national probability sample of 64 U.S. hospital emergency departments (EDs). In a stratified convenience sample of 9 NEISS-AIP hospitals, chart reviewers were trained to recognize and electronically report physician–diagnosed ADEs for patients treated between July 17 and September 30, 2002.
Results: Of the 546 patients (2.2% of all injured patients) presenting for acute care of ADEs, 8.6% were hospitalized for further treatment (compared with 4.3% for other injured patients, $p<0.0001$). The most common reason for ADE–related ED visits was rash/pruritis (20%). The most common medication classes were anti-infective agents (18%), diabetic agents (12%), and cardiovascular agents (9%). Most ADEs were adverse drug reactions (56%). Other ADEs resulted from unintentional overdoses of medications that require close monitoring (19%), inappropriate use of medications by the patient or caregiver (14%), and unintentional ingestions of medications by children (10%). Data collection was >=90% complete for core variables including drug name, route of administration, and event description. Most ADEs (77%) were reported within seven days of ED visit.
Conclusions: Our results show NEISS-AIP can be used for active surveillance of acute community–acquired ADEs. To provide national estimates for developing prevention strategies, we recommend expanding and evaluating ADE surveillance in all NEISS-AIP hospitals.

Key words: Adverse Drug Reaction Reporting Systems, medication errors, overdose, Emergency Medical Services, injury and wounds, Consumer Product Safety

Unintentional Drug-Related Poisoning Deaths — North Carolina, 1997-2001

11:15am

Authors: ***Michael F. Ballesteros, PhD, MS, D. Budnitz, K. Sanford, J. Gilchrist***

Background: In the U.S., unintentional poisoning ranks as the fourth leading cause of injury death. Over the past several years, some states have reported increases in these deaths. We investigated unintentional poisoning deaths in North Carolina to determine the magnitude of the increase and to characterize the circumstances and drugs that caused death.
Methods: We identified unintentional drug-related poisoning deaths using state-based vital statistics ICD cause of death codes for 1997 through 2001, and matched cases with medical examiner (ME) investigated reports for abstraction. We excluded suicides and fatalities with alcohol as the only cause of death.
Results: From 1997 to 2001, we identified 1094 ME-investigated cases. The annual fatality rate per 100,000 population increased from 2.45 in 1997 to 4.76 in 2001. Overall, the decedents' mean age was 38.9, and 68.3% were male. ME conclusions indicated that 71.7% of deaths were caused by a single drug. Among these, deaths from prescription narcotics increased by 300% (32 in 1997 to 128 in 2001), and methadone accounted for 47% of this increase. From 1997 to 2001, 5 of 198 methadone cases were linked to addiction treatment, and 49% of cases with known drug sources were prescribed methadone for treatment of pain.
Conclusions: Narcotics were responsible for much of the rise in these poisoning deaths from 1997-2001. While these substances are commonly prescribed to manage acute and chronic pain, they can be highly addictive and potentially life-threatening to novice users. While additional research in North Carolina is needed to clarify whether drug use was for legitimate pain management or abuse, both physicians and patients need a better understanding of the risks of narcotic use for pain management.

Key words: fatal poisoning, narcotics, methadone, pain

Associations of Body Mass Index and Perceived Weight Category with Suicide Ideation and Suicide Attempts Among Adolescents — United States, 2001

11:35am

Authors: ***Danice K. Eaton, PhD, MPH, R. Lowry, N.D. Brener***

Background: The percentage of adolescents who are overweight has tripled over the past 20 years. Although long-term health effects of adolescent obesity are increasingly recognized, mental health implications of body weight should not be ignored. This study investigated how body mass index (BMI) and perceived weight are associated with suicide ideation and attempts.
Methods: We analyzed data from the 2001 Youth Risk Behavior Survey, a representative sample of 13,601 U.S. high school students. Perceived weight was defined as self-described weight (very underweight, slightly underweight, about right, slightly overweight, or very overweight). A similar five-category BMI variable was calculated from self-reported height and weight. Adjusted odds ratios (ORs) were calculated to describe how BMI and perceived weight were associated with self-reports of having seriously considered suicide and attempted suicide in the past year. We controlled for sex, age, physical activity, weight management practices, and smoking.
Results: In general, BMI was associated with suicide ideation and attempts when we did not control for perceived weight, but these associations were not significant when perceived weight was included in models. Suicide ideation was significantly associated with perceiving oneself as very underweight (OR=2.29), slightly underweight (OR=1.36), slightly overweight (OR=1.33), or very overweight (OR=2.50). Suicide attempts were significantly associated with perceiving oneself as very overweight among white students (OR=2.74) and as very underweight among white (OR=3.04), black (OR=2.86), and Hispanic (OR=3.40) students.
Conclusions: Perceived weight appears to mediate the associations between BMI and suicide ideation and attempts. Perceiving oneself as very overweight or very underweight was associated with an increased risk for suicide ideation and attempts. Further research is needed to understand factors associated with perceived weight and suicide among adolescents.

Key words: Suicide, adolescent, body weight, body image

Homicide Rate versus Violent Crime Rate as Key Health Status Indicators — United States, 1990-1999

11:55am

Authors: ***James A. Litch, MD, DTM&H, J. VanEenwyk, S. Macdonald***

Background: More than 15,000 homicides and 1.4 million violent crimes are reported every year in the United States. Although rates for homicide and violent crime in the United States both peaked in 1980s, the decline differed for these health status indicators during the 1990s. Because violence is commonly monitored through homicide rate data alone as a key health status indicator, we examined the relationship between homicide and violent crime.
Methods: We analyzed homicide and violent crime data from the National Incident-Based Reporting System collected by the Federal Bureau of Investigation Uniform Crime Reporting Program. This program collects voluntarily submitted data from state and local police agencies based on reports by the public. Violent crime is defined as reported offenses of murder and nonnegligent manslaughter, forcible rape, robbery and aggravated assault. Linear regression was used to calculated correlation coefficients and residuals for the relationship between homicide and violent crime rate.
Results: National annual rates of homicide and violent crime from 1990 through 1999 were highly correlated (r = 0.99). The correlation coefficient for annual homicide and violent crime rate data from individual states averaged over the 10 years 1990-1999 was lower (r = 0.78). Fourteen states had residuals larger than the residual standard deviation and three states had residuals larger than two times the residual standard deviation. The wide 95% prediction interval inferred poor predictive value for this relation between indicators.
Conclusions: Use of homicide rates for individual states as a health status indicator does not present an accurate portrayal of violence for all states. Violent crime rate data are also readily available and could supplement homicide rate as a key indicator for states.

Key words: violence, crime, homicide, health status indicators

Thursday Session O
1:30-3:15p
Mackel Award Finalists
Moderator: Perry F. Smith

Epidemic of Serogroup W-135 Meningococcal Disease — Burkina Faso, 2002

1:35pm

Authors: ***Joshua D. Jones, MD, S.R. Tiendrebeogo, B. Koumare, R. Ouedraogo, I. Sanou, D. Caugant, M. Dabal, C. Lingani, E. Traore, M.H. Djingarey, A. Boras, L. Mayer, T. Popovic, A. Yada,C. Zidouemba (deceased), N. Rosenstein, M. Soriano-Gabarro***

Background: Serogroup A *Neisseria meningitidis* causes large meningococcal disease (MD) epidemics in Africa with attack rates of up to 1%. Epidemic control has entailed mass vaccination with bivalent (serogroups A+C) vaccine. By contrast, serogroup W-135 causes only 1-2% of sporadic MD cases. The first documented W-135 epidemic occurred in Saudi Arabia in 2000 among Hajj pilgrims, with cases among their contacts worldwide, including Africa. Because of concern that W-135 would cause African epidemics, we prospectively evaluated the serogroup composition of a MD epidemic in Burkina Faso in 2002.
Methods: We cultured cerebrospinal fluid (CSF) and collected demographic and clinical data on suspected MD cases throughout the epidemic. A suspected case had fever and either neck stiffness, headache or impaired consciousness; a confirmed case had *N. meningitidis* cultured from CSF.
Results: Between 1/1/02 and 5/19/02, 12,790 suspected MD cases and 1,469 deaths were reported in Burkina Faso (case fatality ratio=11.5%). The national attack rate was 108/100,000 and 30 of 53 districts experienced epidemics. Of 205 confirmed MD cases, 167 (81%) grew serogroup W-135 *Neisseria meningitidis*; only 14 (7%) grew serogroup A. The median age of confirmed W-135 cases was 5.0 years (range 0.1-59 years). Only 2% reported contact with a recent Hajj pilgrim; 58% reported recent meningococcal (A/C) vaccination. Molecular analysis of W-135 isolates indicated that all belong to the same clone that caused the 2000 Hajj-associated epidemic.
Conclusions: This first serogroup W-135 epidemic documented in Africa represents a remarkable shift in global MD epidemiology. Because sufficient quantities of the quadrivalent (A/C/Y/W-135) meningococcal polysaccharide vaccine were not available, no vaccination campaign was undertaken. New epidemic control and vaccine development strategies are urgently needed.

Key words: meningitis, meningococcal, W-135, Burkina Faso, epidemic

Hepatitis C Virus Transmission from an Antibody-Negative Organ and Tissue Donor

1:55pm

Authors: ***Barna D. Tugwell, MD, P. Patel, F. Chai, K. Hedberg, O. Nainan, A. Thomas, I. Williams, P. Cieslak***

Background: A patellar ligament allograft recipient developed acute hepatitis C in May 2002, 6 weeks posttransplantation. At the time of death in October 2000, the donor's serum had no detectable antibody to hepatitis C virus (anti-HCV). We determined whether the donor was this tissue recipient's source of HCV infection and the extent of transmission to other organ and tissue recipients.
Methods: Recipient and stored, premortem donor sera were tested for anti-HCV and HCV RNA. A case was defined as HCV infection in a recipient not known to have been infected pretransplantation. Genetic relatedness was evaluated by sequencing the NS5b region (for genotype) and hypervariable region (HVR1) for quasispecies variants.
Results: When tested in July 2002, stored donor serum was anti-HCV negative but HCV RNA positive. Forty persons, in 16 states and two foreign countries, received transplants during 22 months. Four recipients were HCV-infected pretransplantation; the current HCV status of six is unknown. Of the remaining 30 recipients, cases occurred in nine: 3/3 organ recipients, 1/2 saphenous vein recipients, and 5/7 tendon recipients. No cases occurred in recipients of skin (n=2) or bone (n=16). Tissue grafts had been treated with surface chemicals; bone was also irradiated. Genotype of the donor and eight cases sequenced to date was 1a; nucleotide identity among quasispecies of all viral isolates was 95.6%–100%.
Conclusions: This is the first reported outbreak of HCV infection transmitted by tissues from a donor who tested negative for anti-HCV since routine use of second-generation assays. Genetic analysis confirmed relatedness of case and donor viral strains. Although transmission from anti-HCV–negative tissue donors is likely uncommon, enhanced donor screening and virucidal tissue processing merit further consideration.

Key words: Hepatitis C, transplantation, homologous, cross infection, disease outbreaks

Multistate Listeriosis Outbreak Associated with Turkey Deli Meat — United States, 2002

2:15pm

Authors: ***Sami L. Gottlieb, MD, MSPH, C. Newbern, L. Graves, P. Griffin, N. Baker, S. Hunter, M. Jefferson, S. Young, M. Hoekstra, K. Holt, D. Goldman, E. Chernak, C. Johnson, J. Sobel, and the Listeriosis Outbreak Working Group***

Background: Listeriosis is a life-threatening foodborne illness caused by *Listeria monocytogenes* (Lm), which affects approximately 2500 Americans annually. Progressively stricter food safety measures have paralleled a decline in listeriosis incidence since 1989, yet large outbreaks still occur. Between July and October 2002, an uncommon strain of Lm caused an outbreak in nine states.
Methods: Pulsed-field gel electrophoresis was used to subtype Lm isolates and differentiate the outbreak strain from other strains. A case-control study compared food exposures of case-patients infected with the outbreak strain and control-patients infected with different Lm strains during the outbreak period in the same states.
Results: Fifty-four case-patients were identified; eight died and three pregnant women had fetal deaths. The case-control study included 38 case-patients and 54 control-patients. Case-patients consumed pre-cooked, sliceable turkey deli meat much more frequently than did control-patients (Wilcoxon p-value 0.008). In the four weeks before illness, 55% of case-patients had eaten deli turkey breast >1-2 times, versus 28% of control-patients (odds ratio 4.5, 95% confidence interval 1.3–17.1). Investigation of turkey deli meat eaten by case-patients led to examination of several turkey processing plants. The outbreak strain was found in turkey products from one plant and in the environment of a second. Both plants suspended production and recalled >30 million pounds of products. In December 2002, the US Department of Agriculture issued a new directive outlining a targeted microbial sampling program for ready-to-eat meat and poultry products.
Conclusions: Epidemiologic investigation of this outbreak resulted in removal of contaminated food from the marketplace and helped guide policy changes designed to prevent Lm contamination of ready-to-eat meat and poultry products, which could prevent similar outbreaks in the future.

Key words: *Listeria monocytogenes*, disease outbreaks, electrophoresis, gel, pulsed-field, food industry

Exposure to Mosquito Control Pesticides During the West Nile Virus Epidemic — Mississippi, 2002

2:35pm

Authors: ***George E. Luber, PhD, D. Barr, K. Johnson, H. Schurz-Rogers, M. Currier, C. Rubin***

Background: The 2002 West Nile virus (WNV) epidemic in Mississippi (182 cases, 10 deaths) resulted in increased local-government mosquito control (MC) activities, including the application of pesticides by truck-mounted foggers. Because of concerns about potential health effects from MC pesticides and increased use of insect repellents containing DEET (N,N-diethyl-m-toluamide), we investigated to determine if MC activities increased individual urine pesticide metabolite levels.
Methods: From September 8-19, 2002, we randomly selected 193 Mississippi residents from 4 sample areas; two areas were applying MC pesticides and two reference areas were not (non-MC). Participants completed a questionnaire describing home and occupational use of pesticides and DEET and provided a urine sample for analysis of pesticide and DEET metabolites. We verified exposure to MC pesticides by cross-referencing the global positioning systems location of participants with local MC spray routes.
Results: Urinary metabolite levels of MC pesticides (permethrin) did not differ significantly between MC and non-MC areas, suggesting a different source of exposure. Although permethrin metabolite levels did not differ between participants reporting occupational use of pesticides and those who did not, participants reporting home use of pesticides did have higher mean permethrin metabolite levels than those who did not (6.19 µg/L v. 2.00 µg/L, p = .02). Sample region was not a confounder. DEET metabolite levels did not significantly differ between sample regions, or by age, indicating that MC activities did not influence individual's use of DEET.
Conclusions: These findings indicate that local MC activities did not lead to increased pesticide metabolite levels, and that home pesticide use did. The findings are noteworthy because pesticide-based MC represents an important tool in the public health response to WNV.

Key words: West Nile virus, mosquito control, pesticides, DEET, Mississippi

Tomatoes Sicken Hundreds: Multistate Outbreak of *Salmonella* Newport — Eastern and Central United States, July-November 2002

2:55pm

Authors: ***Katrina Kretsinger, MD, S. Noviello, M. Moll, E. Barrett, S. Van Duyne, M. Deasy, S. Zansky, P. Sassano, W. Chmielecki, E. Ribot, FDA Working Group, P. Mead, A. Fry***

Background: *Salmonella* causes approximately 1.4 million foodborne illnesses and 600 deaths annually in the United States. With routine pulsed-field gel electrophoresis (PFGE) by PulseNet, a nationwide bacterial subtyping network, seemingly sporadic cases can now be recognized as outbreaks and linked to widely distributed food items. We investigated a multi-state outbreak of *Salmonella* Newport (*SN*) detected by PulseNet.
Methods: We defined a case as *SN* infection with the outbreak PFGE pattern. We conducted a case-control study among residents of New York, Connecticut, and Minnesota and a follow-up case-control study among residents of Pennsylvania and Virginia. Controls were identified through random-digit dialing. In the second study, controls were frequency matched by county and age. Environmental samples were taken from restaurants associated with clusters of cases of *SN* infection. A traceback investigation of tomato purchases was conducted.
Results: In total, we identified 297 case-patients in 21 states resulting in 42 hospitalizations. In the first study, illness was associated with eating tomatoes (61% of 22 cases versus 34% of 68 controls, odds ratio [OR]=3.45, 95% confidence interval [CI]=1.05-11.34). In the second study, with 46 cases and 98 controls, the only significant risk factor for illness was eating uncooked tomatoes outside of the home (cases 48%, controls 28%, matched OR=2.38, CI=1.11-5.06). The outbreak strain of *SN* was isolated from chopped tomatoes at one restaurant. The traceback identified a single common tomato packing-house in Virginia, where numerous deviations from good agricultural practices and good manufacturing practices (GAP/GMPs) were noted.
Conclusions: This outbreak, detected by PulseNet, involved cases in 21 states and was linked to tomatoes from a single packing house. Adherence to GAP/GMPs by produce suppliers is critical to prevent large outbreaks.

Key words: *Salmonella*, disease outbreaks, epidemiology, pulsed-field gel electrophoresis, PulseNet, tomatoes

Thursday Session P
3:30-5:00p
Mean Microbes — Respiratory and Other Illnesses Caused by Bacterial and Viral Pathogens
Moderators: Kathryn E. Arnold & Cynthia G. Whitney

Cochlear Implants and Bacterial Meningitis in Children: A Public Health Response — United States, 1997–2000
3:35pm

Authors: ***Jennita Reefhuis, PhD, MSc, M. Honein, S. Chamany, K. Biernath, C. Whitney, M. Patterson, S. Manning, S. Avashia, K. Broder, M. Victor, B. Culpepper, P. Costa, E. Mann, C. Boyle and the Cochlear Implant Team***

Background: Nearly 10,000 hard-of-hearing children in the United States have a cochlear implant, a surgically implanted device that enables them to perceive sound. In July 2002, there was a voluntary recall of one device due to concerns about a possible association with meningitis. The Food and Drug Administration (FDA) had been notified of 52 U.S. cases (mostly children) of meningitis in people with various implants, including 5 deaths. We conducted a cohort investigation to ascertain the rate of meningitis in this population.
Methods: We limited the investigation to children who received an implant between 1/1/97 and 8/31/02 and were < 6 years old at surgery. We ascertained all potential cases of meningitis using multiple sources including three implant manufacturers, FDA's Medwatch system, state/local health departments, and a survey of all parents. Possible cases of meningitis were defined as clinically compatible disease; definite cases had bacteria cultured from cerebrospinal fluid.
Results: We identified 25 case-children who had 23 definite and 5 possible bacterial meningitis episodes. Eight episodes (29%) occurred within 29 days of implant surgery. *Streptococcus pneumoniae* was the most common cause (n=15, 54%). The overall rate of meningitis in the cohort was 261.4 children with meningitis per 100,000 person years (95% confidence interval [CI] 173.6–377.6). The rate for bacterial meningitis caused by *S. pneumoniae* was 140.0 (95% CI=78.4–230.9), >30 times the U.S. rate of *S. pneumoniae* meningitis in children <6 in 2000 (3.9 episodes/100,000 population, according to CDC's Active Bacterial Core Surveillance).
Conclusions: The high rate of meningitis observed for children with a cochlear implant may be due to implant factors or to underlying conditions associated with their hearing loss. Further studies are underway to identify risk factors for meningitis in this population.

Key words: bacterial meningitis, *S. pneumoniae*, cochlear implants, deafness, *H. influenzae*, USA, cochlear implantation, hearing aids

Respiratory Virus Infections in Children — Bangladesh, 2000-2001
3:55pm

Authors: ***Pauline D. Terebuh, MD, MPH, W. Brooks, R. Breiman, H. Hall, D. Erdman, J. Hayes, A. Klimov, C. Bridges***

Background: Acute respiratory illness (ARI) is the leading cause of death in Bangladeshi children, accounting for approximately 25% of deaths in children <5 years. We used an existing surveillance system to assess the contribution and seasonality of respiratory viruses to ARI in Bangladesh, where extreme population density and other factors may promote spread of respiratory viruses.
Methods: During December 2000-October 2001, active dengue surveillance for persons with temperature >38ºC was conducted among 14,984 residents of a Dhaka slum. We assayed acute– and convalescent–phase serum pairs from persons meeting selection criteria (dengue negative, age ≤12 years, temperature ≥38.5ºC, cough <5 days) for antibodies to influenza A and B, respiratory syncytial virus (RSV), adenovirus, human parainfluenza (HPIV) types 1, 2, and 3, and human metapneumovirus (HMPV). Acute viral infection was defined as ≥fourfold antibody rise in paired sera.
Results: Among 824 documented febrile illnesses, 279 met selection criteria; 130/279 (47%) had available serum pairs for testing. Twenty-one (16%) of 130 had antibody evidence of 24 acute influenza infections [8 A (H1N1), 3 A (H3N2), and 13 B]. Most (95%) influenza infections occurred during May through August. Sufficient sera remained in 110/130 (85%) serum pairs for non-influenza virus antibody testing. Two (2%) had antibody evidence of RSV infection, four (4%) had adenovirus, nine (8%) had HPIV-3, and 20 (18%) had HMPV. Sixteen (80%) HMPV infections occurred during February through May.
Conclusions: Influenza viruses and HMPV caused febrile respiratory illnesses among Dhaka children and circulated at different times. This study provides important initial information on the burden and seasonality of respiratory viruses in Bangladesh. Studies specifically designed to evaluate the viral ARI burden and to assess prevention options, including influenza vaccination, are needed.

Key words: respiratory tract infections, influenza, metapneumovirus, Bangladesh, season

Legionellosis Among Residents of a Recently Constructed Nursing Facility — Montgomery County, Pennsylvania, 2002

4:15pm

Authors: ***Rachel J. Gorwitz, MD, MPH, R. Garabed, M. Baysinger, C. Shepard, C. Lucas, K. Smith, R. Benson, E. Brown, J. DiMino, B. Fields, R. Besser***

Background: Legionnaires' disease (LD) is an aerosol-transmitted pneumonia with a 14% case-fatality rate. Numerous hospital-associated outbreaks have been reported. Outbreaks in nursing facilities are rarely described. In June 2002, a LD outbreak occurred among residents of a recently-constructed nursing-home. We conducted a cohort study and environmental investigation to identify sources of and opportunities to prevent transmission.
Methods: Residents' exposure to potential transmission sources was obtained by chart-review and staff interviews. Convalescent *Legionella* antibody titers were obtained from 185 of 259 residents. Risk ratios (RR) were calculated for associations between potential exposure sources and (1) laboratory-confirmed (positive culture or urine antigen) LD, and (2) serologic evidence of *Legionella* infection. *Legionella* cultured from facility water were sub-typed and compared to patient isolates.
Results: Eleven LD cases, two of them fatal, occurred among 259 facility residents over a 17-day period. LD risk was greater (RR=8.3, 95%CI=2.3-10.3) among residents who bathed or showered during a two-day period nine days (one incubation period) before the outbreak peak. Thirty-two (22%) of 147 residents who ever showered in the facility had serologic evidence of infection, compared to 3 (8%) of 38 residents who never showered (RR=2.7, 95%CI=0.9-8.5). Going outside near the cooling tower was not associated with infection. *Legionella* isolates from a case-patient and the facility's potable water were identical by monoclonal-antibody-subtyping. Water temperatures and biocide concentrations were conducive to *Legionella* proliferation.
Conclusions: LD transmission likely occurred via aerosolized potable water. Remediation procedures were initiated. LD transmission can occur even in recently-constructed facilities. LD testing should be done in nursing-home residents with pneumonia to allow early detection and interruption of transmission. Water systems should be maintained to limit potential for *Legionella* growth.

Keywords: Legionnaires' disease, *Legionella pneumophila*, nosocomial infections, nursing homes

Burden of Streptococcal Toxic Shock Syndrome and Necrotizing Fasciitis — United States, 2002

4:35pm

Authors: ***Karen D. Cowgill, PhD, MPH, RN, C. Van Beneden, C. Wright, B. Beall, A. Schuchat, and the Active Bacterial Core Surveillance Team***

Background: Streptococcal toxic shock syndrome (STSS) and necrotizing fasciitis (NF) are life-threatening manifestations of invasive group A streptococcal (iGAS) infection which often generate high levels of public anxiety, but for which national statistics are not available. We estimated the burden of STSS and NF in the US.
Methods: We reviewed standardized data from CDC's active population- and laboratory-based Active Bacterial Core Surveillance (ABCs) in eight US areas (2000 population 22,478,311), and supplemental STSS and NF criteria captured by chart review. CDC *emm*-typed available isolates.
Results: From January 1-July 31, 2002, 549 cases of iGAS infections were reported. Supplemental data were available for 363 (66%). Ninety-four (26%) patients had STSS, 63 (17%) had NF, and 33 (9%) had both. Patients with STSS or NF were more often female (54% and 60% vs. 41%; $p<0.05$) and older (mean age: 57 and 57 vs. 46 years; $p<0.05$) than patients with other manifestations. Case fatality ratio was higher for STSS (40%), NF (24%), or both syndromes (33%) vs. other iGAS infections (7%) ($p<0.05$). Chart review increased recognition of STSS by 313% and NF by 218%. Predominant *emm*-types were similar by syndrome: STSS, 1 (23%), 3 (12%), 12 (10%), and 28 (14%); NF, 1 (19%), 3 (11%), 12 (10%), and 28 (13%); other iGAS, 1 (21%), 12 (8%), and 28 (8%). We estimate that iGAS caused 12,100 cases and 1700 deaths in the US in 2002, including 3100 STSS and 2400 NF cases.
Conclusion: GAS causes several thousand cases of STSS and NF each year, but full recognition of disease burden requires enhanced surveillance through chart review. The frequency and severity of disease justify continuing research into vaccine development.

Key words: *Streptococcus pyogenes*, septic shock, Necrotizing Fasciitis, epidemiology

Friday, April 4, 2003
Session Q
8:30-10:00a
The Right Drug for the Bug — Antimicrobial Use and Resistance
Moderator: Richard E. Besser

Two to Tango Without Vanco: Acquisition of Vancomycin-Resistance Genes by *Staphylococcus aureus* from *Enterococcus* in the Absence of Vancomycin Exposure — Pennsylvania, 2002
8:35am

Authors: ***Sarah Y. Park, MD, J. Chaitram, L. Weigel, L. McDougal, S. McAllister, J. Jernigan, C. Whitener, P. Appelbaum, F. Tenover, S. Fridkin***

Background: Vancomycin is the traditional last antibacterial option against *S. aureus* infections, the cause of over 10,000 deaths in the United States yearly. After a report of possibly the second vancomycin-resistant *S. aureus* (VRSA; vancomycin minimum inhibitory concentration = 32 μg/mL) infection, we investigated its source and potential spread.
Methods: The isolate was verified at CDC and evaluated using standard biochemical methods, broth microdilution for susceptibility testing, and plasmid analysis. To identify VRSA carriers, we conducted a nasal carriage study utilizing a ring strategy based on type of contact and length of time from that exposure. Pulsed-field gel electrophoresis (PFGE) of all methicillin-resistant *S. aureus* (MRSA) was performed to identify related *S. aureus*.
Results: The case-patient, a 70-year-old obese male, developed a bone infection associated with an infected chronic heel ulcer, which grew multiple organisms including VRSA. Since July 1999, serial ulcer cultures repeatedly grew vancomycin-resistant *Enterococcus* (VRE) and MRSA; the patient received 63 antimicrobial courses – notably no vancomycin. Of the 263 contacts (93% of total) cultured, only 21 (8%) carried MRSA. No VRSA was identified from contacts or subsequent cultures of the patient. The vancomycin resistance determinant *vanA*, common in VRE, was detected on the VRSA plasmid, which was unusually large for *S. aureus*. Only the MRSA isolated from the patient's daughter had PFGE patterns indistinguishable from those of this VRSA and may represent the parent strain.
Conclusions: VRSA can develop without recent vancomycin exposure. This VRSA likely emerged from an isolate, carried by family members, through genetic transfer of *vanA* from a VRE to MRSA. VRSA prevention should promote appropriate antibiotic use throughout healthcare delivery, without focusing only on vancomycin.

Key words: vancomycin, vancomycin resistance, *Staphylococcus aureus*, *Enterococcus*

Multistate Outbreak of an Emerging Strain of Multidrug-Resistant *Salmonella* — New York, Michigan, Pennsylvania, Connecticut and Ohio, 2002
8:55am

Authors: ***Stephanie S. Noviello, MD, MPH, J. Painter, A. Gupta, P. Kalluri, D. Schoonmaker-Bopp, F. Ramsey, P. Smith, B. Wallace, S. Zansky***

Background: During the past 5 years, incidence of *Salmonella* Newport (SN), particularly multidrug-resistant strains including SN-MDR-AmpC, significantly increased in the United States. SN-MDR-AmpC is resistant to ≥9 antimicrobial agents and exhibits decreased susceptibility to ceftriaxone, an agent used to treat serious infections in children. In February 2002, New York State health officials identified a cluster of SN-MDR-AmpC; cases in four other states were subsequently reported.
Methods: To identify the source of illness, we conducted a case-control study. Case-patients were defined as patients from whom SN was isolated from January–April 2002 with a matching pulsed-field gel electrophoresis (PFGE) pattern. Controls were randomly selected and frequency-matched by age group and region. Ground beef samples were cultured and typed by PFGE.
Results: Forty-seven case-patients were identified. Seventeen (37%) were hospitalized and one died. Six of seven human isolates tested were SN-MDR-AmpC. The first 36 case-patients and 84 controls were enrolled in the case-control study. Of 26 case-patients who answered definitively, 12 (46%) had eaten raw or undercooked ground beef in the 3 days before symptom onset, compared with one (1%) of 80 controls (odds ratio=68, 95% confidence interval=8–1508). SN-MDR-AmpC with a PFGE pattern indistinguishable from the outbreak strain was isolated from uncooked meatloaf prepared by a case-patient before illness. The United States Department of Agriculture identified a meat-packing plant that could have supplied ground beef to case-patients.
Conclusions: This outbreak, the first to implicate ground beef as a source of SN-MDR-AmpC, illustrates the spread of antibiotic resistance from animal products to humans. To decrease human illness from SN-MDR-AmpC, enhanced consumer education regarding safe preparation of ground beef and implementation of ground beef irradiation might be considered.

Key words: Salmonella, antimicrobial resistance, disease outbreaks, meat products

Antibiotic Prescribing Patterns Among Obstetrician-Gynecologists for Upper Respiratory Tract Illness — United States, 2002

9:15am

Authors: ***Shadi Chamany, MD, S. Schrag, J. Schulkin, A. Schuchat, L. Riley, R. Besser***

Background: Penicillin resistance to *Streptococcus pneumoniae*, the leading cause of pneumonia and meningitis, rose from 8% in 1992 to 27% in 2000. Inappropriate antibiotic prescribing for upper respiratory tract infections (URIs) contributed to this phenomenon. Campaigns to decrease inappropriate prescribing for URIs have targeted the public and primary care providers but little is known about prescribing among obstetrician-gynecologists (OB-GYNs), primary care providers for many women. We conducted a cross-sectional survey of OB-GYNs to describe knowledge, attitudes, and practices regarding URIs and to determine whether efforts to improve prescribing should target them.
Methods: We sent an anonymous questionnaire to 1031 OB-GYNs across the country asking about patient expectations for antibiotics. A second mailing was sent to non-responders. Clinical scenarios were used to assess likelihood of prescribing for URIs using a Likert scale. A descriptive analysis of the data was performed.
Results: Of 1003 eligible OB-GYNs, 489 (49%) responded, with a median of 15 years in practice. On average, only 5% of respondents' patients present with URIs. Of OB-GYNs who see non-pregnant women, 69% believed patients expect an antibiotic for a cold, cough, or flu symptoms and 47% would prescribe an antibiotic for a cold. However, providers reported only 30% of women request antibiotics for these infections. Overall, 75% of respondents felt they could reduce antibiotic prescribing by ≥10% without adversely impacting patient care but only 40% felt this was possible without decreasing patient satisfaction.
Conclusions: Antibiotic prescribing for URIs and misconception of patient expectations are prevalent among OB-GYNs. However, given the low frequency of office visits for URIs, public education targeting adults will be more effective than efforts aimed at OB-GYNs.

Key words: antibiotic prescribing, obstetrician-gynecologists, respiratory tract illness

Assessment of Adherence to Six-Dose Regimen of Coartem™ for Treatment of Uncomplicated Malaria in Children Under Five Years — Tanzania, 2002

9:35am

Authors: ***Louise M.A. Causer, MBBS, MScPH, DTM&H, S. Abdulla, A. Vincent-Mark, M. Kabanywanyi, R. Khatib, H. Williams, S. Kachur, P. Bloland***

Background: The development of drug resistance is one of the greatest challenges to the success of the Global Malaria Control Strategy. Coartem™, the only commercially available co-formulated artemisinin-containing combination therapy for malaria, is being proposed as a first-line treatment where multi-drug resistance is developing. Though efficacious, the dosing regimen is complex, raising concerns regarding effectiveness. To address this, we conducted a study to assess adherence to a six-dose regimen of Coartem™ in Tanzania.
Methods: We recruited 300 children <5 years old with uncomplicated malaria attending the outpatient department of Mkuranga district hospital. We randomly assigned each child to receive Coartem™ administered by a nurse in hospital (observed) or by the parent/caregiver at home (non-observed). We monitored enrolled children for 28 days and assessed adherence based on parasitologic, hematologic, pharmacologic, and reported adherence differences between the two groups.
Results: To date 61 children have completed 28-days follow-up, and results suggest cure rates of 80.0% and 90.3% for observed (n=30) and non-observed (n=31) groups, respectively. There were no early treatment failures and no observed difference in mean hemoglobin change between the two groups. Among parents/caregivers of all non-observed children (n=38) enrolled thus far, 100% reported giving all six doses of Coartem™. Thirty-four (89.5%) gave Coartem™ with food and 32 (84.2%) gave Coartem™ at the recommended times.
Conclusions: The preliminary results of this ongoing study suggest there is no difference in adherence between the two groups, and that parents/caregivers are capable of adhering to this more complex dosing schedule. Coartem™ was well tolerated and acceptable to parents/caregivers. Coartem™ could be considered as an alternative antimalarial where increasing resistance is limiting efficacy of current therapies.

Key words: Malaria, Falciparum; Drug Therapy, Combination; Patient Compliance; Drug Resistance

Friday Session S
1:30-3:30p
International Health
Moderator: Stephen B. Blount

Clinical Diagnosis of Malaria and Implications for Drug Policy — Tanzania, 2002
1:35pm

Authors: ***Louise M.A. Causer, MBBS, MScPH, DTM&H, S. Abdulla, H. Williams, H. Shebuge, D. Magonyozi, H. Msuya, A. Marugo, P. Bloland***

Background: Drug resistance is one of the greatest challenges to malaria control and is forcing countries to adopt increasingly expensive drugs. Over-diagnosis of malaria contributes to the development of resistance and escalating treatment costs. Clinical diagnosis, the most prevalent diagnostic modality in endemic countries, is sensitive but not specific, contributing to over-diagnosis. In order to inform an ongoing process of malaria treatment policy development in Tanzania, we conducted a survey to determine prevalence of malaria parasitemia and the frequency of misdiagnosis occurring in rural health facilities.
Methods: During February-April 2002 in four districts, we conducted exit interviews and collected blood for malaria smears on a sample of outpatients (n=4177) and inpatients (n=398) attending three hospitals, four health centers, and nine dispensaries. We also measured hemoglobin (Hb) levels in patients <5 years old.
Results: The overall prevalence of parasitemia among outpatients was 24.7%. Among those with clinically diagnosed malaria (n=2344), 809 (34.5%) were parasitemic, with those ≥5 years old (n=1211) significantly less likely to be parasitemic than those <5 years old (n=1133) (26.1% vs 43.2%, p<0.001). Health workers in hospitals and health centers were more likely than those in dispensaries to overdiagnose malaria (67.7%, 72.0% and 59.3%, respectively, p<0.0001). Among patients <5 years old with clinically diagnosed malaria, moderate-severe anemia (Hb<8g/dL) was more prevalent (p<0.001) in those with parasitemia (n=490, 33.7%) than those without (n=643,13.2%).
Conclusions: These results demonstrate that when clinical diagnosis is used, considerable overdiagnosis of malaria is common in patients of all ages. Measurement of anemia may be useful as an adjunct to improve diagnostic accuracy. Improved diagnostic modalities are urgently needed to improve malaria case management and minimize unnecessary antimalarial drug use.

Key words: malaria, diagnosis, parasitemia, microscopy, drug resistance

— Late-Breaker Abstracts —
Are Listed in a Separate Booklet

Burden of Disease and Etiologies of Culture-Confirmed Neonatal Sepsis — Soweto, South Africa, 2000 – 2001
1:55pm

Authors: ***Rachel J. Gorwitz, MD, MPH, D. Wilson, C. Cutland, V. Quan, H. Gani, S. Haque, F. Butler, S. Madhi, S. Schrag***

Background: Neonatal bacterial infections are a leading cause of infant death in developing countries, and produce debilitating sequelae in survivors. However, few data exist on rates and specific causes of these infections. Strategies exist for preventing neonatal group B streptococcal (GBS) infection, the most common cause of neonatal sepsis (NS) in the developed world. Characterizing the burden of disease in less-developed areas could therefore motivate and guide prevention efforts. We describe results of retrospective surveillance for NS at the only hospital serving Soweto, South Africa in 2000-2001.
Methods: Culture-confirmed NS (blood or cerebrospinal fluid cultures growing pathogenic microorganisms) among hospitalized infants <2 months-old was identified by review of computerized laboratory records. Clinical information was abstracted from patient charts. Rates of NS were calculated, using number of live births at this hospital and affiliated satellite birthing centers in 1998-99 (44,000) as the denominator. Chi-square statistics were used to compare rates.
Results: Early-onset NS (sepsis with onset during days-of-life 0-6) was significantly more common than late-onset (days 7-60) NS (4.0 versus 2.4 cases per 1000 live births; p<0.001). Case-fatality rates were 27% for early-onset and 18% for late-onset disease. GBS was the leading cause of sepsis in both age groups, causing one-quarter of disease in each group. *Klebsiella* was the next most common pathogen.
Conclusions: Similar to most developed countries, GBS is the most common cause of NS in Soweto. Rates of early-onset NS are over twice current U.S. rates, and similar to U.S. rates before GBS prevention strategies were widely implemented. Case-fatality from NS in Soweto is well above current U.S. rates. Adoption of GBS prevention strategies could greatly reduce neonatal disease and mortality in Soweto.

Keywords: neonatal sepsis, group B streptococcal infections, neonates, developing countries, surveillance

Risk Factors for Mortality During Landslides — State of Chuuk, Federated States of Micronesia, 2002

2:15pm

Authors: ***Carlos A. Sanchez, MD, S. Young, N. Siren, T. Lee, J. Malilay***

Background: Hydrometeorological disasters, which have occurred twice as frequently since 1996, kill almost 1,200 people worldwide per week. These events often precipitate massive landslides, whose role in overall mortality has not been established. We investigated deaths from landslides in Chuuk during Tropical Storm Chata'an July 2–4, 2002, to characterize mortality and formulate preventive strategies.
Methods: We reviewed death certificates identified by the state hospital and calculated mortality rates using the state population census. We defined case subjects as people who died from trauma or suffocation due to landslides and control subjects as people present at the site and time of the landslide. We interviewed case proxies and control subjects to compare demographic, behavioral, and structural characteristics. Unconditional logistic regression was used to obtain effect estimates.
Results: We identified 43 deaths from 13 landslides occurring on six islands, with an overall mortality of 1.47 deaths per 1000 habitants. Almost 90% died immediately, 56% were female, and 52% were children <15 years of age. We interviewed 40 case proxies and 52 control subjects. Though the landslides occurred over a 12-hour period, 74% of interviewees were previously unaware of other landslides, and 83% did not know that landslides could accompany tropical storms. Prior awareness of landslides (odds ratio [OR]=0.21; 95% confidence interval [CI]=0.06–0.77) was protective, and attention to warning signs
such as rushing water and rumbling earth remained protective even after adjustments for age and awareness (adjusted OR=0.09; 95% CI=0.02–0.45).
Conclusions: Our results suggest that viable risk reduction strategies include improving communication systems and targeting community preparedness to include knowledge of landslide hazards during tropical storms.

Key words: disasters, natural disasters, Micronesia, mortality

Enhanced Screening and Treatment of Vietnamese Montagnard Refugees — Cambodia and North Carolina, 2002

2:35pm

Authors: ***Jhankhana Jina Shah, MD, MPH, S. Maloney, L. Causer, P. Wilkins, S. Johnston, H. Bishop, E. Flagg, S. Merritt, S. Young, P. Bloland, M. Cetron***

Background: High rates of tuberculosis (TB), malaria, and intestinal parasites have been reported in Vietnamese refugees. CDC implemented an enhanced health assessment program for US-bound Vietnamese Montagnard refugees to decrease morbidity from these diseases. We evaluated the utility of screening and treatment program components, both overseas and stateside.
Methods: In 2002, 802 Montagnard refugees were urgently relocated from Cambodia to North Carolina (NC). Overseas, refugees were screened for pulmonary TB by chest radiographs and acid-fast bacilli smears to prevent transmission during travel. Additional program components included rapid testing and treatment for malaria and mass empiric treatment with albendazole for intestinal parasites. In NC, refugees had additional TB screening including tuberculin skin testing and TB cultures, and submitted stools for parasite testing to evaluate effectiveness of treatment. Febrile refugees also received malaria smears.
Results: In Cambodia, one refugee with smear-positive TB was identified and treated. Among 777 refugees tested for malaria, 18 (2%) required treatment. In addition, 751 refugees (94%) completed albendazole treatment. In NC, where additional testing modalities were used, four refugees were diagnosed with smear-negative active TB. One refugee had extra-pulmonary TB, and two had been identified overseas with suspect pulmonary TB. Among albendazole-treated refugees who submitted stools, only 11 (1.7%) and 57 (8.9%) of 635 had helminths and pathogenic protozoa, respectively. No refugees had newly diagnosed malaria.
Conclusions: Overseas screening and treatment for TB, malaria, and intestinal parasites were useful interventions; additional testing performed in NC augmented the ability to diagnose all active TB cases. CDC recommends enhanced health assessment programs for other refugee groups. Overseas and stateside program components should be determined by geographic disease risks, pre-treatment disease prevalence, and testing capabilities.

Key words: refugee, tuberculosis, parasites, malaria, mass screening

Hyperendemic Botulism — Republic of Georgia, 1980 - 2002

2:55pm

Authors: ***Jay K. Varma, MD, G. Katsitadze, N. Chakvetadze, T. Khukhalashvili, M. Chubinidze, M. Chokheli, T. Zardiashvili, M. Moiscrafisvili, P. Imnadze, J. Sobel***

Background: Foodborne botulism is a potentially fatal paralytic illness. Though rare, botulism cases are public health emergencies, because contaminated food may cause large outbreaks. A possible increase in botulism cases in the Republic of Georgia (ROG) prompted us to evaluate surveillance and study risk factors for illness and death.
Methods: We reviewed existing surveillance data and evaluated the sensitivity of surveillance through active case finding in hospitals, public health offices, and homes. We abstracted medical records of botulism patients hospitalized from 1980-2002.
Results: In 2001, ROG ascertained 34 botulism cases (0.8 per 100,000 persons). The median annual case count increased from 15 during 1980-1990 to 42 during 1991-2001. Interviews with physicians and epidemiologists identified only one unreported, suspect case from 2001 and three from 2002. A survey of 357 systematically sampled homes in one urban neighborhood identified no undiagnosed cases from 1996–2002. In a retrospective cohort of 619 botulism patients, 587 (69%) became ill from home- conserved vegetables. Forty-three (7%) patients died. In univariate analysis, the risk of death increased among patients presenting with shortness of breath (Relative Risk [RR]=15.1, 95% Confidence Interval [CI]=5.5-41.9) or difficulty swallowing (RR=9.0, 95% CI=1.3-64.7). Patients who required mechanical ventilation were 23 times more likely to die than those who did not (95% CI 12.3-43.9).
Conclusions: ROG has the highest reported rate of botulism in the world. National economic collapse in the 1990s may have changed food preparation and consumption practices, which may explain the increased incidence post-1991. By identifying critical control points in the vegetable conservation process, we hope to develop cost-effective, culturally appropriate preventive measures. Educating hospital staff about risk factors for death could reduce mortality.

Key words: botulism, foodborne, paralysis, Georgia (Republic), vegetables