Drug Resistance to Antibiotics Continues To Spread

Multi-drug resistance (MDR) to antibiotics continues to increase as strains not covered by the pneumococcal conjugate vaccine PCV7 have replaced those included in the vaccine as the source of disease in the US population. Although these non-vaccine strains represented only 16% of the multiple resistant isolates before the introduction of the vaccine in 2000, they represent one of every two multiple resistant isolates today. Resistance is expected to increase until it reaches a plateau, dependent upon the cumulative exposure to antibiotics in the US population.

M.R. Jacobs, MD, PhD, Case Western Reserve Medical School, reported on a study of serotypes of *S. pneumoniae* isolated in a University Hospital setting in the United States between January 1997 and December 2005. Vaccine associated types remained relatively constant. The appearance of type 19A increased from <10%/year in 2002 to 30%/year by 2005. Drug resistance in type 19A to beta-lactams, azithromycin and clindamycin also increased.

Dr. Jacobs also presented evidence showing changes in the serotype distribution and drug resistance patterns of pneumococcal isolates before and after the introduction of PCV7. Serotypes of *S. pneumoniae* were isolated by the Clinical Microbiology Laboratory of the University Hospitals of Cleveland from January 1997 to December 2005. Of 1,119 strains isolated, 377 (33.7%) were MDR, all were penicillin nonsusceptible; 219 were also resistant to a macrolide and trimethoprim-sulfamethoxazole (SXT). Resistance to clindamycin was seen in 141 MDR isolates.

Dr. K.K. Hsu presented an analysis of serotype distribution and antibiotic resistance of invasive pneumococcal disease (IPD) isolates identified via surveillance of microbiology reports of isolates collected from sterile body sites of children <18 years in Massachusetts. Between October 2001 and September 2005, 357 cases of IPD were identified (269 in children <5 years). Serotyping was available for 263 (74%) cases; 61 (23%) were vaccine-type and 202 (77%) were nonvaccine-type. Serotype 19A was the etiology in 58 (22%) cases and progressively increased over the 4 years (10%, 11%, 29%, and 45% of IPD isolates [years 1-4 respectively]; p<0.01). No other nonvaccine-type demonstrated a significant increase over this period.

Highlights from the
Interscience Congress on Antimicrobial Agents and Chemotherapy 2006 Symposium

Dr. D.J. Farrell presented the year 5 data (2004-2005) from the PROTEKT US program, which monitors trends in the prevalence and antibacterial susceptibility of an erm(B)+mef(A) serotype 19A clone, not covered by the current PCV7 pneumococcal vaccine. In year 5, 148 *erm*(B)+*mef*(A) serotype 19A isolates were collected from patients aged 0-2 years of age. Among these pediatric patients, the *erm*(B)+*mef*(A) 19A clone accounted for 21.9% (148/1440) of all erythromycin-

Continued on page 11

mg/kg (Day 8). No concentrations were found on days 18 to 31. The numbers of enterococci, *E. coli*, lactobacilli, and bifidobacteria were reduced, while other enterobacteria and yeasts increased. There was no impact on bacteroides. No *C. difficile* strains were isolated. The investigators concluded that dalbavancin and tigecycline do not select for intestinal colonization of *C. difficile*.

In most parts of the world CDAD is not required to be reported to public health authorities, resulting in a limited understanding of its epidemiology. To gain a better understanding of what is occurring with this disease, Dr. Steven Gelone and colleagues launched the first global, web-based surveillance project of CDAD (wwww.rmhca.com/cdadproject/) in October 2005. As of May, 2006 there were 775 clinician respondents. A total of 630 (81%) were from the US and 145 (19%) were from the rest of the world (Table 1) [Gelone et al. ICAAC 2006 K1006].

Increased participation in this worldwide surveillance project would contribute to a better understanding of the epidemiology of CDAD.

Table 1: US versus Rest of World (ROW) Results

	US (n = 630)	ROW (n = 145)
Increased # of cases of CDAD	315 (50%)	34 (24%)
Increased # of severe cases of CDAD	316 (51%)	46 (32%)
Increased treatment relapse	353 (56%)	48 (33%)
Attributable colectomy	220 (35%)	33 (23%)
Attributable death	189 (30%)	35 (24%)

Continued from page 4

resistant SP isolates collected in year 5, compared with 1.1% (9/825) in year 1 and 8.5% (60/710) in year 3. All *erm*(B)+*mef*(A) serotype 19A isolates in year 5 were MDR (resistant to ≥2 antibacterial classes), with high rates of resistance to amoxicillin-clavulanate (83.1%), cefuroxime (100%), erythromycin (100.0%), cotrimoxazole (100%), and tetracycline (100.0%). Resistance to telithromycin was rare (0.7%) and no isolates were levofloxacin resistant.

Type 19A has steadily increased in prevalence, as well as in resistance to common drug classes. The multiresistant *erm*(B)+*mef*(A) SP 19A clone continues to spread in the US. Common among patients aged 0-2 years, this SP 19A clone exhibits a high degree of MDR, particularly to the β-lactams and the macrolides. Results of the studies presented at the 2006 ICAAC conference in San Diego point to a growing need to include this serotype in future vaccine formulations.

Continued from page 5

into the air as did female volunteers. No significant alteration of the airborne spreading patterns under different clothing conditions was found. Thus, the most efficient reduction in the airborne spread of *S. aureus* was obtained by changing into sterilized surgical scrubs. However, even under the most effective clothing regime 0.12 CFUs/m3/min of *S. aureus* were spread into the environment.

Special accommodations such as isolation procedures for *S. aureus* carriers suffering from these conditions appear unjustified in view of the airborne dispersal of this pathogen. However, patients and staff should be encouraged to practice basic hand washing techniques, which may include antiseptic washes and shampoos and the application of topical antibiotic ointments to the anterior nares of the nose. The use of disposable aprons and gloves by staff reduces skin-to-skin contact and may therefore further reduce the risk of transmission. The spread of *S. aureus* is of particular concern as it has become resistant to many commonly used antibiotics [Stucki et al. *Antimicrobial Agents and Chemotherapy* 2006].