

ANTIMICROBIAL RESISTANCE

WHAT IS THE PUBLIC HEALTH ISSUE?

- In the United States and around the world, many important human infections are developing resistance to the antimicrobial drugs used to treat them. Up to 35% of *Streptococcus pneumoniae*, an organism which is a common cause of ear infections, meningitis, and pneumonia, found in some areas of the United States are no longer susceptible to penicillin, and multidrug resistance is common. About 16% of *S. pneumoniae* are now resistant to “third generation” cephalosporin antimicrobials, and resistance to the newest fluoroquinolone antimicrobials has also emerged. In the 1970s, virtually all *S. pneumoniae* were susceptible to preferred drugs.
- Nearly all strains of *Staphylococcus aureus*, a common cause of skin and more serious infections, in the United States are resistant to penicillin and over 60% of *S. aureus* infections acquired in U.S. intensive care units are now resistant to the preferred methicillin class drugs (Methicillin resistant *S. aureus*, also called MRSA) and usually have multidrug resistance. In 2002, two cases of *S. aureus* resistant to the drug vancomycin, for years the only effective treatment, were reported.
- MRSA strains identified recently outside of healthcare settings often have antimicrobial susceptibility patterns that differ from healthcare associated strains and carry a virulence factor that may increase the chance for serious illness.
- Resistance to the most effective antimicrobial drugs can require treatment with less effective and more expensive alternatives, which may also be associated with a greater risk for side effects. Some infections found among hospitalized patients are resistant to virtually all effective antimicrobial drugs available, making therapy difficult.

WHAT HAS CDC ACCOMPLISHED?

- *Surveillance and Response:* CDC, in collaboration with state and local health departments, monitors and tracks drug-resistant infections. For example, pneumococcal infections are tracked in 10 geographic areas with a combined population of 20 million; healthcare-acquired infections in 300 hospitals in 15 states; and foodborne and diarrheal infections in 50 states. CDC also monitors drug-prescribing practices.
- *Applied Research:* In 2003, CDC awarded over \$4 million in grants to 11 academic institutions for applied research on antimicrobial resistance. CDC develops laboratory tests to detect drug resistance; studies the molecular basis of resistance; and evaluates interventions, such as improved prescribing and infection control practices.
- *Infrastructure/Training:* CDC improves the capacity of health departments, healthcare providers, and clinical laboratories to detect and report resistant infections and to implement prevention and control strategies. CDC’s Multilevel Antimicrobial Susceptibility Testing Educational Resource Program website provides up-to-date information on susceptibility testing, and a CD-ROM was developed to train clinical microbiology laboratory personnel on standardized susceptibility testing methods.
- *Prevention and Control:* CDC translates research findings into community-based and healthcare-based prevention programs to promote appropriate antimicrobial use, infection control, vaccine use, and detection of drug-resistant infections. CDC and an alliance of partners aim to improve antimicrobial use in the United States through the public health campaign, “Get Smart: Know When Antibiotics Work” which uses public service announcements and comprehensive outreach. CDC’s “Campaign to Prevent Antimicrobial Resistance in Healthcare Settings” focuses on providing evidence-based methods for preventing antimicrobial resistance among specific patient populations.

WHAT ARE THE NEXT STEPS?

In 1999, CDC, the Food and Drug Administration, and the National Institutes of Health co-chaired a task force to better coordinate public health efforts to address antimicrobial resistance. Since 2001, the agencies have been implementing the task force’s action plan as resources allow. Priority actions include improving monitoring of drug resistance and use; improving drug prescribing by educating the public and clinicians to reduce the development and spread of resistance in the community; and improving infection control practices to prevent the transmission of drug-resistant infections in healthcare settings and elsewhere.

For additional information on this or other CDC programs, visit www.cdc.gov/program

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