

Inventory of Projects

**Progress Report: Implementation of
A Public Health Action Plan To Combat Antimicrobial Resistance (Part I: Domestic Issues)**

Progress through 2006

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Focus Area I: Surveillance			
Action Item #1: Determine Which Organisms and Susceptibility to Specific Antimicrobial Drugs Should Be under Surveillance and Create a Mechanism for Periodic Updating of This List.			
CDC, USDA, FDA, DoD, VA	Public Health Surveillance	Organisms currently under public health surveillance for antimicrobial resistance include: <i>Campylobacter</i> , <i>E. coli</i> O157:H7, Gram negative and Gram positive organisms causing health care associated infections, group A <i>Streptococcus</i> , group B <i>Streptococcus</i> , <i>Haemophilis influenzae</i> , <i>Helicobacter pylori</i> , HIV, Influenza, Malaria, <i>Mycobacterium tuberculosis</i> , <i>Neisseria gonorrhoeae</i> , <i>Neisseria meningitidis</i> , <i>Pneumocystis carinii</i> , Salmonella, Shigella, <i>Staphylococcus aureus</i> , <i>Streptococcus pneumoniae</i> , <i>Streptococcus pyogenes</i> , <i>Trichomonas vaginalis</i> , and Vancomycin Resistant Enterococcus. Organisms are added to this list when resistance emerges as a public health problem, as tools are developed for detecting resistance, and when there is capacity at the appropriate level. On August 30, 2006, FDA cleared a new test for the detection of vancomycin resistant Enterococci (VRE) by detecting vanA and vanB genes using an automated real-time PCR Instrument. It is indicated for use for patients at risk for VRE colonization.	Ongoing. See Executive Summary and Surveillance Data (to be released following public comment period, summer 2007).

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
TOP PRIORITY			
Action Item #2: With Partners, Design and Implement a National AR Surveillance Plan.			
CDC, FDA, NIH, USDA	Expansion and enhancement of the National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria	NARMS is a collaboration among FDA (Center for Veterinary Medicine), CDC and U.S. Department of Agriculture. . . The NARMS program has three components or "arms" (human, retail, and animal) from which select foodborne bacteria are characterized from human clinical cases, retail meats, and food animals at federally inspected slaughter and processing plants. . . Additionally, ten state laboratories, who also participate in FoodNet, submit a proportion of Campylobacter isolates to the CDC NARMS laboratory. In 2002, NARMS launched the retail component. Currently, nine participating states test grocery store meat products for the presence of select enteric bacteria and corresponding antimicrobial susceptibility profiles. Salmonella slaughter isolates recovered from chickens, turkeys, cattle, and swine were submitted to the NARMS animal program through the USDA Food Safety and Inspection Service (FSIS) Salmonella HACCP Verification Testing Program.	Ongoing. NARMS has been expanded to all 50 states, providing national surveillance for antimicrobial resistance among select foodborne pathogens. Campylobacter sampling in the ten FoodNet states has been changed to allow for burden estimates and a plan for further expanding to more sites is underway. Five additional sites send enterococci and <i>E. coli</i> isolated from outpatient stools to CDC NARMS for antimicrobial susceptibility testing. NARMS FDA, CDC, and USDA NARMS scientists met at the International Conference on Emerging Infectious Diseases, held March 19-22, 2006, in Atlanta to review progress on implementing the development of complementary databases, increasing the timeliness of reporting, and harmonizing annual reports. Since then, all three agencies have compiled and submitted a jointly agreed upon executive report of 2003 NARMS Salmonella and Campylobacter data. CVM released the report on CVM's website on February 5, 2007.
CDC, FDA	Surveillance Planning	Coordinate surveillance activities. Initial meeting was held with CDC April 2001. Interagency cooperation remains a high priority within the department. Information sharing and coordinated activities continue to increase between agencies.	Ongoing. The NARMS program is currently undergoing an extensive review by the FDA Science Board, focusing on 4 major areas: sampling strategies, data reporting and harmonization, coordinated research, and international surveillance activities.
CDC	National molecular surveillance of antibiotic-resistant <i>Streptococcus pneumoniae</i>	The Respiratory Diseases Branch (RDB) and our collaborators at the Emory Rollins School of Public health will establish a national laboratory for the molecular surveillance of invasive <i>Streptococcus pneumoniae</i> (<i>Spn</i>). We will provide front-line information concerning established and newly emerging antibiotic resistance mechanisms, clonal types, and serotypes of ABCs <i>Spn</i> isolates. We will monitor effects of currently used vaccines and antibiotics on the emergence and distribution of antibiotic-resistant strains.	Ongoing. Emergence of multi-resistant strains not targeted by the pneumococcal conjugate vaccine: Since introduction of the 7 valent conjugate vaccine (PCV7), serotype 19A has become the predominant invasive serotype and the primary source of antibiotic resistance; multilocus sequence typing (MLST) indicates that this is due to the emergence of new resistant strains. We have characterized at the molecular level the first example recorded in nature of a serotype switch event (resulting in 19A serotype) with concurrent conversion to penicillin-nonsusceptibility due to a single genetic event. We have also noted increases in antibiotic-nonsusceptible strains of other serotypes not targeted by PCV7 and are completing MLST analysis of these isolates. One paper has been submitted, one is in preparation, and work is ongoing toward a third publication. An increase in beta-lactam resistance has been documented over the past 2 years and this is probably due to the increase in penicillin nonsusceptibility among serotype 19A.
CDC	National surveillance for the impact of pneumococcal conjugate vaccine use and appropriate antibiotic use campaigns on drug-resistant <i>Streptococcus pneumoniae</i>	CDC's Active Bacterial Core surveillance (ABCs) is a high-quality, active, population-based system operating in 10 states with a population of over 20 million persons under surveillance. ABCs has tracked drug-resistant <i>S. pneumoniae</i> since 1995, collecting approximately 3000 invasive disease strains yearly for susceptibility testing and serotyping. Data analyses by serotype can evaluate the ongoing impact of conjugate vaccine use on resistance; by linking to data on antibiotic use inferences can also be made about a possible impact of appropriate use measures. ABCs is CDC's main system for tracking drug-resistant pneumococcus and the impact of interventions.	In 2006, approximately 3000 cases of invasive disease were identified through ABCs and serotyping and susceptibility testing of isolates is nearing completion. Analyses are planned that will examine the trends of DRSP and link those to antibiotic and vaccine use in the regions.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Antimicrobial resistant neonatal sepsis in the era of GBS prophylaxis	Major reductions in neonatal sepsis caused by group B streptococcus have been documented over the past decade, but a potentially alarming increase has been detected in ampicillin resistance among selected other neonatal pathogens, especially in the low birth weight or preterm newborn. Because higher mortality is associated with ampicillin resistant gram negative infections, preliminary data on these trends raised alarms. CDC's Emerging Infections Program network, through ABCs, provides an opportunity to monitor longer term, wider-spread trends in sepsis in the first week of live and correlate ampicillin resistant <i>E. coli</i> infections with maternal receipt of intrapartum antibiotics. Enhancement of the neonatal sepsis surveillance activities in four EIPs can also address the impact of recent recommendations for use of vancomycin in the setting of penicillin allergy among women who carry group B streptococcus resistant to clindamycin.	ABCs surveillance since 1998 shows that <i>E. coli</i> is the number 2 pathogen causing invasive neonatal sepsis, after group B streptococcus. In 2005, some surveillance areas have a higher incidence of <i>E. coli</i> sepsis than GBS sepsis. This is due to declines in GBS sepsis. <i>E. coli</i> sepsis incidence appears stable with a trend towards an increased incidence among preterm incidence. An analysis of risk factors for <i>E. coli</i> sepsis and for ampicillin-resistance <i>E. coli</i> sepsis found that exposure to at least four hours of intrapartum antibiotic prophylaxis was protective among term infants. Among preterm infants, exposure to intrapartum antibiotics was not associated with either outcome. Preterm delivery was the strongest single risk factor, with an adjusted population attributable risk of 59%.
CDC	Treatment Practices, Outcomes and Cost of Multidrug-resistant (MDR TB) and Extensively Drug Resistant Tuberculosis (XDR TB) in the United States.	The purpose of this project is to provide detailed observational data on the current treatment characteristics, outcomes and costs of multidrug resistant (MDR) and extensively drug resistant XDR TB cases in the United States. The study aims to collect treatment, outcome, and cost data which are generalizable to the U.S. population of MDR and XDR TB cases. The objectives of the project are to describe the clinical and case management practices currently employed to manage MDR TB and XDR TB cases, determine the frequency and contributing factors of further acquired drug resistance during treatment among MDR TB cases, describe factors associated with favorable MDR/XDR TB patient outcomes, and determine costs and payer sources for treatment and case management of MDR and XDR TB for a population representative of the US MDR TB case population.	Ongoing. Project is being announced by PGO.
CDC	Federal TB Task Force Response to Extensively Drug-resistant (XDR) TB	In November of 2006, the Federal TB TF convened to discuss the possible USG response to the global threat of XDR TB. It was decided that the TB TF would draft an action plan describing the potential U.S. government (USG) response to XDR domestically and internationally. The TB TF divided into 8 workgroups to draft each section (Surveillance, epidemiology and outbreak investigation; laboratory; infection control; clinical and programmatic; research; communications and education; partnerships; and cost analysis). The 1992 National Action Plan to Combat MDR TB was used as a model. In April 2007, an initial draft was completed and is undergoing review.	A draft of the plan had been circulated for the task force members to review. The plan will also be shared with external partners for review and comment before it is entered into multiple agency USG clearance.
CDC	Surveillance for Emerging Antimicrobial Resistance Connected to Healthcare (SEARCH)	The appearance of MRSA with reduced susceptibility to vancomycin (vancomycin-intermediate <i>Staphylococcus aureus</i> [VISA]), and resistance (vancomycin-resistant <i>Staphylococcus aureus</i> [VRSA]) is concerning and may be a warning that more strains resistant to vancomycin could soon appear. SEARCH is a network of voluntary participants (i.e., hospitals, private industries, professional organizations, and state health departments) which have joined together to report the isolation of <i>Staphylococcus aureus</i> with reduced susceptibility to vancomycin. All U.S. healthcare organizations and practitioners are encouraged to report such isolates to SEARCH and, after notifying their state health department, to send the isolates to CDC for confirmatory testing.	Ongoing. As of April 2007, CDC has confirmed 17 VISAs and seven VRSAs in the U.S. Updated guidance on infection control measures and investigations and appropriate laboratory testing was posted on the CDC website in September 2006.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	MRSA disease in Alaska	In recent years, several community outbreaks of MRSA skin infections have occurred among Alaska Natives and in some areas 85% of all <i>Staphylococcus aureus</i> isolated are methicillin-resistant. Risk factors for disease include recent antimicrobial use, having a household member with a skin infection, use of sauna which has <i>S. aureus</i> isolated from it, and use of a crowded sauna. Current activities include establishing laboratory surveillance for MRSA, identifying patients with severe disease education about MRSA risk factors and prevention.	Ongoing. Currently collecting isolates for surveillance for CAMRSA from regional hospital in southwest Alaska where the outbreak occurred. Progress includes: Molecular characterization of CA-MRSA strains from rural Alaska. The aim is to define the molecular epidemiology of CA-MRSA infections among Alaska Natives. 160 MRSA strains were collected and included strains from two skin infection outbreaks. Also included were strains from prospective laboratory-based surveillance for MRSA conducted at a rural hospital. Every third strain from this set was genotyped using pulsed-field gel electrophoresis (PFGE) and multilocus sequencing typing (MLST), examined for in vitro antimicrobial susceptibility, and the Panton-Valentin leukocidin (PVL) gene. Methicillin resistant elements were determined by staphylococcal cassette chromosome mec typing. Forty-one of 124 prospective strains have been analyzed. All carried the SCCmec type IV element and were PVL positive. The majority (83%) of these strains aligned with ST1 (USA400).
CDC	Alaska Sentinel Surveillance for Antimicrobial Resistance in <i>Helicobacter pylori</i> isolates from Alaska Natives	The <i>H. pylori</i> surveillance system in Alaska is a sentinel system based at hospitals located in five regions of Alaska which include urban and rural populations. Antral and fundal biopsies are obtained from patients undergoing routine diagnostic esophagogastroduodenoscopy (EGD), and sent to the CDC Arctic Investigations Program (AIP) laboratory for culture and antimicrobial susceptibility testing of the <i>H. pylori</i> isolates. Determining the resistance profile of <i>H. pylori</i> isolates at the individual and regional level is becoming increasingly important in areas of high endemicity where resistance rates tend to be elevated.	<i>H. pylori</i> data from from 7/99-6/03 were used to determine the susceptibility of <i>H. pylori</i> isolates to metronidazole (minimum inhibitory concentration (MIC) of > 8 µg metronidazole/ml), clarithromycin (MIC>1), tetracycline (MIC>2) and amoxicillin (MIC>1) using agar dilution. Nine hundred sixty-four biopsy specimens were obtained from 687 participants; 352 (51%) patients tested culture-positive. Mean age of both culture-positive and culture-negative patients was 51 years. Metronidazole resistance was demonstrated in isolates from 155 (44%) persons, clarithromycin resistance from 108 (31%) persons, amoxicillin resistance from 8 (2%) persons and 0 for tetracycline resistance. Metronidazole and clarithromycin resistance varied by geographic region. Females were more likely than males to show metronidazole resistance (p < .01) and clarithromycin resistance (p = .05). Reference: Bruce, MG. <i>Helicobacter</i> 2006; 11: 581-88.
CDC	An analysis of molecular epidemiology of multidrug resistant <i>M. tuberculosis</i> in the United States	The purpose of this research project is to develop a comprehensive national tuberculosis (TB) genotyping registry for TB case-patients with multidrug-resistant <i>M. tuberculosis</i> (MDR-TB) and to assess the molecular epidemiology of MDR-TB in the United States (U.S.). Through this investigation, the Division of TB Elimination (DTBE) at the Centers for Disease Control and Prevention (CDC) will work with 14 selected U.S. TB Epidemiologic Studies Consortium (TBESC) sites to collect epidemiologic and genotyping data from all MDR-TB case-patients in the U.S. This will be a five-year cross-sectional population based study design where recruitment and data collection are handled prospectively starting on October 1, 2005 through 2010.	Project is currently in a piloting phase with 4 of 14 sites enrolling patients.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Enhanced collection and electronic transfer of data on Antimicrobial Use and Resistance (AUR)	A cooperative study of enhanced collection, compilation, and transmission of data on antimicrobial use and resistance from automated laboratory instrumentation systems in healthcare settings to CDC and other public health systems using architecture fully compatible with the Public Health Information Network (PHIN). This will create a database that will facilitate benchmarking and performance feedback to promote local AR improvement efforts; development of regional, state, and national data about patterns of use and resistance; and evaluation of prevention programs.	Ongoing. During 2005, TheraDoc software was modified to successfully create HL7 Version 3 messages containing microbiology, pharmacy and admission/discharge/transfer (ADT) data from a pilot healthcare facility. This data complies with the AUR option in the medications-associated module of the National Healthcare Safety Network (NHSN) which began early in 2005. During 2006, TheraDoc software was deployed at one additional pilot healthcare facility. Also, the software tool developed at CDC was modified to produce HL7 Version 3 messages containing pharmacy and ADT data. In addition, this tool was updated to create messages with much greater efficiency which minimizes processing time. Additional advancements were implemented for processing received messages. There are now 5 pilot healthcare facilities transmitting microbiology lab, pharmacy and ADT data to CDC.
CDC	National Tuberculosis Surveillance System (NTSS)	Ongoing collection, analysis, and communication of national tuberculosis surveillance information; expanded in 1993 to include the frequency and type of AR, enabling strategically focused tuberculosis control and elimination efforts. The expanded national TB surveillance system has proven its usefulness in assisting in the evaluation of the success of TB control efforts and monitoring the status of the epidemic, particularly through the collection of data on initial drug susceptibility. Information on the use of initial regimens of four first-line drugs, directly observed therapy and completion of therapy in one year or less have been used as measures to evaluate program success. As future efforts towards TB elimination increase, both existing and new surveillance systems at the national, state, and local levels will become even more critical to monitor the burden and impact of TB, evaluate the success of control and prevention efforts, and direct planning and policy development.	Ongoing. Data collection and analysis are gathered on a continuous basis. Since 1993, when the case report was expanded to include drug susceptibility results, the proportion of patients with primary MDR TB decreased from 2.5% to 1.0% each year during 1998-2001. After an increase to 1.2% in 2002, the proportion decreased to 0.9% in 2003. In 2003, the percentage of U.S.-born persons with MDR TB decreased, from 0.7% in 2002 to 0.6%. Of the total number of reported MDR TB cases, the proportion occurring in foreign-born persons increased from 31% in 1993 to 74% in 2003. The CDC annual TB surveillance report, Reported Tuberculosis in the United States, 2005, provide detailed summaries of anti-TB drug resistance from the national surveillance data. This report and other publications and recommendations based on these data are available on the internet http://www.cdc.gov/nchstp/tb/surv/surv2005/default.htm .
CDC	Surveillance for Emergence of Hepatitis B Resistance to Antiviral Agents among Alaska Natives	Alaska Natives have a high prevalence of chronic HBV infection and 1350 chronically infected persons are followed every 6 months. Within the Alaska Native Health System, a plan has been developed to monitor HBV-infected candidates for treatment for antiviral resistance by: 1. Testing pretreatment sera for the four licensed agents for antiviral resistance. 2. Monitoring those under treatment every 3 months for antiviral resistance to all four agents. 3. Monitor those on therapy for antimicrobial resistance using nucleic acid based Line Probe Assay and switch or add other nucleoside analogs that are sensitive.	Status - 45 persons are currently being treated with a nucleoside analog for HBV. - 32 have received lamivudine - 8% tested pretreatment were already lamivudine resistant - 22% developed lamivudine resistance during treatment - All patients on treatment developing NA resistance have been switched to other regimens. - Criteria for selection of treatment candidates have been developed based on 2007 updated guidelines from the American Association for the Study of Liver Disease.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Surveillance for drug resistant invasive bacterial diseases in Alaska	The Artic Investigations Program conducts statewide laboratory-based surveillance for invasive <i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i> , <i>Neisseria meningitidis</i> , and Groups A and B <i>Streptococcus</i> . Surveillance for invasive <i>H. influenzae</i> began in 1980, <i>S. pneumoniae</i> in 1986, and the other organisms in 1998. The population under surveillance is the State of Alaska, a total of 626,932 persons (Census 2000). Case detection occurs year-round as participating laboratories from all hospitals throughout the state send isolates recovered from sterile sites to the AIP lab in Anchorage, accompanied by basic demographic and clinical information on the cases. Materials and forms for isolate shipment and data collection are provided to each lab by AIP. Staff from AIP complete a surveillance form for each case and collect clinical and sociodemographic information. At year-end, AIP asks that each laboratory review their records and provide information on any cases that may have been overlooked.	Invasive disease caused by all five surveillance organisms was made reportable to the State of Alaska, Division of Public Health in 2007. Early indications are that mandatory reporting may increase case ascertainment and may provide a more complete picture of antimicrobial resistance. For example, one additional clinical lab is now participating in surveillance since the change in reporting requirements.
CDC	Antimicrobial resistant early-onset sepsis and maternal intrapartum antibiotic use	Increased use of antibiotic prophylaxis during labor and delivery to prevent perinatal group B streptococcal (GBS) disease has decreased the rate of early-onset GBS infections by 81%. As more antimicrobial drugs are used in the labor and delivery setting to prevent mother-to-child transmission of group B streptococcus, the risk of newborns acquiring infections with other perinatal pathogens, such as <i>E. coli</i> drug resistant infections might increase. The objectives of this project are to monitor trends in early-onset infections with non-GBS pathogens including drug resistant <i>E. coli</i> in selected areas, to evaluate whether antimicrobial drug use during labor and delivery is associated with an increased risk of drug resistant <i>E. coli</i> , and to assess the impact of a penicillin G shortage on prophylactic use of penicillin, ampicillin, and other agents during labor and delivery.	Surveillance for non-GBS sepsis is ongoing in the Active Bacterial Core Surveillance (ABCs). A review of a random sample of births in 1998 and 1999 found that 27% of deliveries were exposed to intrapartum antibiotics. A review of a random sample of births in 2003 and 2004 was just completed to evaluate antibiotic agents used for GBS prophylaxis, with a particular focus on use of vancomycin and on the impact of a new penicillin G shortage in 2004. Preliminary results suggest that the overall proportion of deliveries exposed to intrapartum antibiotics has remained stable with minor variation across states. Ampicillin is used more commonly than penicillin; clindamycin use remains common despite new guidelines narrowing the circumstances for administration of this agent. Very few deliveries received vancomycin reflecting either caution on the part of physicians or lack of awareness of the 2002 recommendations that allow for use of this drug in some circumstances.
CDC	Surveillance and detection of antimicrobial resistant invasive fungal infections among organ transplant recipients	Goals of this project are to detect and monitor trends in emerging antimicrobial resistance among invasive fungal infections, and develop a collection of such strains for applied research by CDC and other researchers. To accomplish these goals we will refine and maintain a provider-based sentinel network of organ transplant centers to collect surveillance data, and fungal isolates, related to invasive fungal infections among persons who have received stem cell or organ transplants. This will be accomplished through a new cooperative agreement. This population is at highest risk for anti-fungal resistant <i>Candida</i> spp. and mold infections. There is no current system to track emerging anti-fungal resistance among fungal infections nationally.	Awarded cooperative agreement through Office of Extramural Affairs by publishing a new Program Announcement "Organ Transplant Infection Detection and Prevention Program." Funded 2 applications which will support 3 transplant centers each: University of Pittsburgh (includes Pittsburgh, University of Toronto, Cleveland Clinic) and University of Alabama (includes Alabama, University of Michigan, and University of Pennsylvania). Held investigators meeting (November, 2004, September 2005) during which time protocol approvals, information technology development, and operational procedures were completed. Patient enrollment began in April 2006.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Sentinel Surveillance for African Trypanosomiasis Treatment Failure	A resurgence of African trypanosomiasis (sleeping sickness) caused by <i>Trypanosoma brucei gambiense</i> occurred during the past two decades in central Africa. The disease is invariably fatal if untreated. The disease reservoir is human and, therefore, effective treatment is a critical element of the control strategy. Melarsoprol is the most important therapeutic agent, and the emergence and potential spread of drug resistance is a serious threat, in view of the limited alternative therapies and the fatal disease outcome. We developed a sentinel surveillance system (HATSENTINEL) to gather data about the diagnostic and treatment protocols in use, treatment failures, and drug resistance. There are currently 3977 patients enrolled in 9 facilities in 5 countries: Angola, the Democratic Republic of Congo (DRC), Sudan, Tanzania and Uganda.	Ongoing. To date, surveillance has documented 3 sites within Angola and DRC with high rates of melarsoprol treatment failure. In a small disease focus in northern Angola, the melarsoprol failure rate was 100%. Melarsoprol failure rates of 25-55% (depending on the specific site) were found in East Kasai Province, DRC, which currently has the greatest sleeping sickness burden in central Africa. Health authorities in these countries were previously unaware of the existence or magnitude of the clinical failure of melarsoprol. Analysis has shown an association of melarsoprol treatment failure with a high white cell count (>100) in cerebrospinal fluid at initial diagnosis. Four sentinel sites are now monitoring for treatment failure with the alternative drug eflornithine. Eflornithine remains fully effective at these sites. Although difficulties with isolation and cryopreservation of <i>T. b. gambiense</i> isolates were experienced, the method was refined. Parasite isolates from patients at initial presentation and at relapse have been collected from East Kasai province in DRC.
CDC	Enhanced surveillance of influenza viruses for resistance to licensed drugs and development of tests for rapid detection of drug-resistant strains with pandemic potential	Improved molecular tests for rapid diagnosis of mutants resistant to both the old and new drugs are needed for pandemic preparedness as well as for inter-pandemic control of influenza. This project studies avian influenza viruses of different subtypes, which will improve pandemic preparedness. In addition, it will evaluate existing biochemical tests and develop new molecular techniques for detecting influenza A and B mutants resistant to neuraminidase inhibitors (NIs), which will improve surveillance for drug-resistant variants among human influenza viruses.	In 2006, surveillance for resistance to licensed drugs (M2 blockers: amantadine and rimantadine) in human isolates from the US and other countries was continued. Concerning increase in the proportion of influenza A(H3N2) viruses resistant to amantadine/rimantadine circulating in many countries was revealed. In particular, it was shown that in the US the percentage of influenza A(H3N2) viruses resistant to amantadine/rimantadine was much higher (14%) than in previous years (~1% published in <i>The Lancet</i> on September 22, 2005 [see Bright RA et al., <i>The Lancet</i> , 2005; 366: 1175-1181]. Continued analysis of different subtypes of influenza virus isolates resistant to amantadine/rimantadine did not reveal their antigenic difference from viruses sensitive to the drugs.
CDC	Surveillance for Invasive Methicillin-Resistant <i>Staphylococcus aureus</i> through the Active Bacterial Core surveillance (ABCs), Emerging Infections Program	Population-based surveillance at 9 ABCs sites for both community-associated and healthcare-associated invasive MRSA disease. Data collected are used to determine incidence rates for invasive MRSA disease, detect at-risk populations, and explore strain characteristics through collection of MRSA isolates.	ABCs, part of CDC's Emerging Infections Program, conducts ongoing, active, population-based surveillance for invasive pathogens, including MRSA, in selected areas of the United States. In 2005, the entire state of Connecticut and 23 counties in eight other states (California, Colorado, Georgia, Maryland, Minnesota, New York, Oregon, and Tennessee) monitored MRSA infections. All cases of invasive MRSA reported during 2005 were used to calculate incidence rates. Demographic and outcome data were analyzed from case reports obtained during July 2004–June 2006. The analysis was limited to cases occurring in patients with a history of peritoneal dialysis or hemodialysis during the preceding 12 months; recurrent cases were excluded. The number of dialysis patients was obtained for Connecticut and the 23 counties from the United States Renal Data System dialysis population count (as of December 31, 2004) for use as denominators; 2005 denominators were not yet available
CDC	Surveillance of Multi-drug resistant infections through National Healthcare Safety Network (NHSN), formerly National Nosocomial Infections Surveillance system (NNIS)	Surveillance of healthcare associated infections with the ability to describe antimicrobial resistance associated with these infections.	Ongoing. Data from this system continue to provide national trends of a variety of antimicrobial-resistant healthcare-associated infections.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC, DoD	Gonococcal Isolate Surveillance Project (GISP)	Sentinel surveillance system for monitoring antimicrobial resistance of <i>Neisseria gonorrhoeae</i> in the United States established in 1986. Male urethral gonococcal isolates together with clinical and demographic patient data are submitted for susceptibility testing each month from STD clinics in approximately twenty-eight cities in the United States. GISP data demonstrate the ongoing spread of fluoroquinolone-resistance and the emergence of <i>N. gonorrhoeae</i> with decreased susceptibility to azithromycin in the U.S. GISP data are published in an annual report and periodically in the MMWR. (http://www.cdc.gov/std/gisp) contains GISP annual reports from 1998-2005 as well as important reference and link resources.	Ongoing. GISP data were used to update and revise the 2006 CDC's Sexually Transmitted Diseases Treatment Guidelines. Finalized data from 2006 will be available by Fall 2007. (<i>Update to CDC's STD Treatment Guidelines, 2006: Fluoroquinolones NO Longer Recommended for Treatment of Gonococcal Infections</i> . MMWR, April 13, 2007, 54 (14).) Location-specific (city, state, region) alerts and guidelines are regularly updated on the CDC's GISP website.
DoD	Development of a DoD AR surveillance plan consistent with the national AR surveillance plan	Establish an overarching framework for facilitating the implementation, operation, and evaluation of activities in AR surveillance within DoD.	Ongoing.
DoD	DoD antimicrobial resistance surveillance network	Under a Cooperative Research and Development Agreement (CRADA) with private industry, developing a DoD-wide AR surveillance network for identifying AR occurrences and trends within the military population. The cornerstones of this mechanism are: 1) the provision of daily, independent quality-assurance review and feedback of a military laboratory's susceptibility test results by experts in the field, 2) the continuous generation of up-to-date antibiograms based on an individual medical facility's AR patterns, 3) access to validated information on antimicrobial resistance occurrences and trends in the facility's geographic region for evaluating their implications for military personnel, and 4) facilitation of DoD-wide monitoring of AR trends to improve evidence-based decision and policy making on antibiotic usage and patient care, and 5) to enhance DoD ability to identify and respond to AR events of military significance in a timely manner.	Ongoing. Electronic antimicrobial susceptibility testing quality assurance and analysis system TSN from Focus-Bio-Innova (now Eurofins Medinet) is being used in 4 DoD pilot sites, 3 in the US and 1 in Europe. Expansion to additional sites has been proposed. TSN is viewed by its parent company as "mature" and is not seeking to add additional sites, but has not ruled out additional DoD participation. Linkage of these sites into a DoD network (pilot sites plus DoD-GEIS) for information aggregation, sharing and analysis of AR trends accomplished in 2005-6.
FDA	Proposed Rule – Surveillance/Reporting	Publish proposed rule regarding surveillance and annual reporting (included with proposed rule "Safety Reporting for Human Drug and Biologic Products").	Assessing economic impact of the proposed regulation. Final Rule not yet published.
FDA	Guidance - Surveillance Planning	Develop guidance relating to surveillance and annual reporting (based upon proposed rule "Safety Reporting for Human Drug and Biologic Products").	Assessing economic impact of the proposed regulation.
VA	a. Emerging Pathogens Initiative (EPI) b. Review of commercially available computer software to be used for infection prevention, control and containment	a. The Veterans Health Administration (VHA) currently has an ongoing and well-defined AR surveillance plan (the EPI, a laboratory-based automated surveillance system) b. VA is actively reviewing computer off-the-shelf software products to assist in infection control processes for prevention and control of infectious diseases including antimicrobial resistant organisms; computer-assisted decision support systems will be a key element in VA's choice of product.	a) Currently over 158 VHA facilities across the country transmit data to the EPI monthly. The data collected by the EPI are being reviewed by the Infectious Diseases Program Office and reported to the Veterans Integrated Service Networks (VISNs = VA regional offices). Enhancements that acquire additional information on antimicrobial resistance of specified organisms were distributed to reporting stations in July 2004; ongoing enhancements to acquire even more information have been requested and are currently in process. Review of process for reporting information back to VISNs was undertaken and determined it should continue with annual reports; this review is still in process and will continue. b) review and evaluation of off-the-shelf products remains in process for issue of antibiotic resistance, as well as having features that will assist in evaluation of healthcare-associated infection analysis.

<u>AGENCY</u>	<u>PROJECT TITLE</u>	<u>DESCRIPTION</u>	<u>STATUS</u>
VA	Emerging Pathogens Initiative (EPI)	The VHA uses standardized definitions and methods to set local parameters for surveillance in the EPI system. EPI data regarding some AR organisms have been returned to the Veterans Integrated Service Networks with reporting station specific data included. National quartiles have also been provided for use at the Network and local level. Confidentiality is a key element in any activity undertaken by the VHA. Great effort has been put forth to maintain confidentiality of the Emerging Pathogens Initiative surveillance data set. Access is strictly limited for any data with unique identifiers.	Ongoing.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #3: CDC	Develop Standards and Methodologies. Methods for the measurement of multi-drug resistant organisms (MDROs) in healthcare settings	Development of guidance for healthcare facilities on the measurement of MDROs including MRSA	"Management of Multidrug-Resistant Organisms in Healthcare Settings" published in 2006. http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf
CDC	Grant Program for applied research on antimicrobial resistance: characterization of strains of Community-Associated Methicillin-Resistant <i>Staphylococcus aureus</i> (CA-MRSA)	This research includes three components that will provide information needed to prevent and control AR: (1) Identification and access to a defined population of persons within which community-associated MRSA disease and data appear to be sufficiently prevalent to allow appropriate analyses; (2) obtaining strains of <i>Staphylococcus aureus</i> (<i>S. aureus</i>) causing disease in this population with appropriate, linked epidemiologic and clinical data; and (3) characterizing MRSA strains using a variety of molecular and biochemical techniques.	Five three-year awards were made in 2003. Recipients include: Harbor-University of California Los Angeles Research & Education Institute, University of California at San Francisco, University of Chicago, William Beaumont Hospital, and Columbia University. Projects underway, results pending. Funding cycle complete. results highlighted in the following: 1) Genetic background affects stability of <i>mecA</i> in <i>Staphylococcus aureus</i> . <i>J Clin Microbiol.</i> 2005 May;43(5):2380-3. 2) Necrotizing fasciitis caused by community-associated methicillin-resistant <i>Staphylococcus aureus</i> in Los Angeles. <i>N Engl J Med.</i> 2005 Apr 7;352(14):1445-53. 3) Incidence of and risk factors for clinically significant methicillin-resistant <i>Staphylococcus aureus</i> infection in a cohort of HIV-infected adults. <i>J Acquir Immune Defic Syndr.</i> 2005 Oct 1;40(2):155-60.
CDC	Grant Program: Applied Research on AR - Validation of National Committee for Clinical Laboratory Standards (CLSI) Breakpoints for Bacterial Human Pathogens	The purpose of the program is to provide assistance for applied research aimed at prevention and control of the emergence and spread of AR in the United States. This program will focus on validation of CLSI breakpoints for bacterial human pathogens of public health importance. This research includes three components that will provide information needed to prevent and control AR: (1) validating existing interpretive criteria for pathogens of public health importance; (2) developing new interpretive criteria for pathogens of public health importance using existing CLSI methods and quality control; and (3) developing new interpretive criteria and new antimicrobial susceptibility testing methods for pathogens of public health importance using existing CLSI methods and quality control as a starting point for novel test development.	Funding cycle complete. Results highlighted in the following: 1) Reevaluation of Enterobacteriaceae MIC/disk diffusion zone diameter regression scattergrams for 9 B-lactams: adjustments of breakpoints for strains producing extended spectrum B-lactamases. <i>Diagnostic Microbiology and Infectious Disease, Volume 52, Issue 3, Pages 235-246.</i> 2) Burgess DS, et. al. <i>Clin Microbiol Infect.</i> 2007: 13(1)33-9. 3) Jorgensen JH, et. al. <i>J Clin Microbiol.</i> 2006:44(5)1744-54.
FDA	Development of CLSI/NCCLS testing standards	Campylobacter is one of the primary foodborne pathogens under surveillance in NARMS. Additionally, many bacteria that cause disease in aquatic animals require growth conditions that vary substantially from routine terrestrial bacterial pathogens, thus the need for development of standardized testing methods.	Completed development of a standardized in vitro susceptibility testing method for Campylobacter including the determination of quality control ranges for fourteen antimicrobial agents of human and veterinary importance. This method was incorporated into the Clinical and Laboratory Standards Institute (CLSI) M45-A guideline "Methods for Antimicrobial Dilution and Disk Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria". Also completed a multi-laboratory study to evaluate the use of disk diffusion for screening Campylobacter isolates for resistance to ciprofloxacin and erythromycin which has been incorporated in the CLSI M45 guideline. Completed development of standardized in vitro susceptibility testing methods for bacteria isolated from aquatic animals. These methods were incorporated into the Clinical and Laboratory Standards Institute (CLSI) M42-A guideline "Methods for Broth Dilution Susceptibility Testing of Bacteria Isolated from Aquatic Animals", and M49-A guideline "Methods for Antimicrobial Disk Susceptibility Testing of Bacteria Isolated from Aquatic Animals".
USDA	QC testing as a part of NARMS	Methodologies and standards for Salmonella, Campylobacter, E. coli and Enterococci have been developed and implemented as a part of NARMS.	Ongoing. Regular teleconferences. The use of broth microdilution for susceptibility testing of Campylobacter was adopted in 2005. Test conditions and standards for Listeria are being explored. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Antimicrobial susceptibility testing for <i>Listeria</i>	Methodologies and standards for antimicrobial susceptibility testing of <i>Listeria</i> are being developed and implemented.	New. A new <i>Listeria</i> broth microdilution plate will be constructed and tested in 2007. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
Action Item #4: Address Additional Surveillance Issues Unique to AR.			
CDC	Enhance availability of antimicrobial-resistant microbes to researchers	Collection and sharing of vancomycin-intermediate and vancomycin-resistant <i>Staphylococcus aureus</i> (VISA/VRSA) with researchers by donating to NIH's Network for Antimicrobial Resistance in <i>S. aureus</i> (NARSA)	Ongoing. All 7 VRSA isolates identified in the U.S. have been deposited in NARSA repository and sample of VISA and MRSA isolates as well.
CDC	Surveillance for Antimicrobial Resistance among Paratyphoid Fever Infections in the United States	Determine the susceptibility patterns of <i>Salmonella</i> Paratyphi A, B, and C collected in the United States for a one year period and determine associated travel history, clinical syndrome, and drug use.	Through NARMS all 50 states participated in the <i>Salmonella Paratyphi</i> study. States submitted all Paratyphi A, B, and C isolates received at their public health laboratories to CDC and interviewed all cases for enhanced surveillance. Data have been completed and manuscript for publication is being drafted.
CDC	Clinical Outcomes in Multi-Drug Resistant non-Typhi <i>Salmonella</i> Serotypes	Enhanced surveillance for non-Typhi <i>Salmonella</i> to investigate the impact of multi-drug resistance on clinical outcomes.	Ongoing: Through NARMS, FoodNet sites are participating and sending a representative sample of non-Typhi <i>Salmonella</i> isolates to CDC for testing. States are interviewing all cases for enhanced surveillance.
CDC	Estimating the public health and economic burden of disease caused by drug resistant <i>Streptococcus pneumoniae</i>	The goals of this project are to estimate the burden of disease caused by <i>Streptococcus pneumoniae</i> , including the proportion caused by antibiotic resistant strains. In cooperation with investigators at Harvard Pilgrim Healthcare, we are using existing data to design a mathematical model that will account for all pneumococcal syndromes (e.g., otitis, noninvasive pneumonia, invasive disease). A secondary objective is to estimate the economic costs associated with the disease.	Awarded a cooperative agreement to Harvard Pilgrim Healthcare. We have had one face-to-face meeting and several conference calls to discuss model design and inputs. A meeting of an expert panel is planned for November 2007 to review progress to date.
CDC	Estimating the public health and economic burden of disease caused by drug resistant Group A streptococcus	The goal of this project is to estimate the burden of disease caused by Drug-Resistant Group A streptococcus (GAS). The project will draw from estimates of the prevalence of resistance among GAS isolates from CDC's Active Bacterial Core surveillance as well as the scientific literature on resistance. Burden of disease will be estimated from national databases of health care visits and hospitalizations as well as ABCs data on disease rates.	The project received funding and work has begun on the study design.
CDC	National Burden of antimicrobial resistant neonatal sepsis	Neonatal sepsis, including bloodstream infections, meningitis, pneumonia and clinical sepsis, is a leading cause of illness in early life that can result in long-term disability and death. The emergence of antimicrobial resistance among common neonatal pathogens, particularly <i>Escherichia coli</i> and <i>Staphylococcus aureus</i> , threatens successful treatment of these infections and has raised concerns about overuse of intrapartum antibiotics. Recent studies have detected vaginal MRSA colonization in up to 11% of pregnant women late in pregnancy. However, there are no precise estimates of the overall burden of disease caused by drug-resistant neonatal pathogens upon which to base clinical guidelines and policy decisions. The primary objective is to estimate the burden of antimicrobial resistant sepsis in the first three days of life (early-onset). Although different pathogens cause early-onset sepsis, the epidemiology and mode of transmission are similar.	This project is a collaboration between 3 CDC centers, Emory University, and the National Institute of Child Health and Development's (NICHD) neonatal network. Through CDC's Active Bacterial Core surveillance (ABCs) and NICHD's neonatal network, we will conduct active surveillance for early-onset neonatal sepsis from 2007-2009. We will use these data, along with data from the National Nosocomial Infections Surveillance (NNIS) System from 1995 through 2004, to estimate the incidence of neonatal sepsis due to specific pathogens and due to drug-resistant organisms. We will then apply these estimates to national estimates of the incidence of invasive and clinical neonatal sepsis from the National Hospital Discharge Survey (NHDS) to project the US burden of overall and drug-resistant neonatal sepsis. Data from ABCs and the NICHD network will be used to compare outcomes of infants with MRSA and methicillin-susceptible <i>S. aureus</i> (MSSA) infections, and to characterize intrapartum and postnatal antibiotic exposures.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Monitoring Drug Resistance in Lymphatic Filariasis Elimination Programs	Annual mass treatment with antifilarial drugs (albendazole plus either ivermectin or diethylcarbamazine) is the cornerstone of the global program to eliminate lymphatic filariasis (LF). Although the primary goal of the program is to interrupt transmission of LF, additional benefits also are expected because of the known anthelmintic properties of these drugs. Substantial reductions in the prevalence of intestinal helminth infections are associated with mass treatment for LF. Though encouraging, the results also raise questions about the intensity of selection for albendazole resistance. Genes for resistance to benzimidazoles are known to occur at a low frequency in all nematodes studied to date. Monitoring for drug resistance has not been done as part of the LF elimination program. We are monitoring the development of albendazole resistance in the context of the LF Elimination Demonstration Project in Leogane, Haiti.	Stool collections in FY05 and FY06 were concentrated in communities with a prevalence of hookworm infection of >20% prior to the implementation of mass drug administration (MDA) for lymphatic filariasis. From over 2000 persons tested, 11 persons were hookworm positive; thus, the prevalence of infection has declined more than 95% following MDA. Hookworm eggs from these persons and from persons residing in areas that are not under MDA were purified in the field along and transferred to our collaborators at the College of Veterinary Medicine at the University of Georgia. Using newly developed PCR assays for nucleic acid within individual eggs, all of the parasites examined showed the albendazole-sensitive genotype; thus, to date, there is no evidence for albendazole resistance.
FDA	Antimicrobial surveillance plan	Development of a surveillance plan for antimicrobial drug resistance among clinical laboratory isolates.	In final stage. A five year option contract was awarded to Focus Technologies in October 2002. Focus Technologies is completing the final data request in FY07. This completes the contract. Announcement of Focus Contract (http://www.pnews.com/cgi-bin/stories.pl?ACCT=VANW_VA_story&STORY=/www/story/11-18-2002/0001843012&EDATE=Nov+18,+2002)
FDA	See Action Item #2 (Proposed Rule - Surveillance/Reporting).	See Action Item #2 (Proposed Rule Surveillance/Reporting).	See Action Item #2 (Proposed Rule -Surveillance/Reporting).
FDA	See Action Item #2 (Guidance).	See Action Item #2 (Guidance).	See Action Item #2 (Guidance).
USDA	Implementation of the Collaboration in Animal Health and Food Safety Epidemiology (CAHFSE).	Collaboration in Animal Health, Food Safety, and Epidemiology (CAHFSE) is a comprehensive USDA program designed to address animal health and food safety issues, including antimicrobial resistance, utilizing continual tracking of the selected data points. This program includes on-farm sample collection and data and risk factor analysis (APHIS), research efforts with molecular and phenotypic characterization of isolates, pathogenesis and development of intervention strategies (ARS), and in-plant efforts for sample collection, data analysis and risk assessment (Food Safety and Inspection Service (FSIS)).	Ongoing. As of 2006, a total of 1209 on-farm swine fecal samples from 31 farms were analyzed for Salmonella. A total of 516 of these samples were analyzed for the presence of Campylobacter, E. coli, and enterococci. The incidence of Salmonella, Campylobacter, E. coli, and enterococci was 7%, 27%, 87%, and 60%, respectively. The incidence of Salmonella, E. coli, and enterococci was consistent with previous years, while the level of Campylobacter was almost 50% less than in previous years. The predominant serotypes of Salmonella were S. Derby, S. Typhimurium 5(-), S. Heidelberg, and, S. Mbandaka.
USDA	Participation in the Regional Dairy Quality Management Alliance (RDQMA).	The mission of the RDQMA is to assure a healthful and safe food supply by advocating the adoption of best management practices (BMPs), which promote animal health and welfare, improve productivity and profitability of dairy farms and encourages environmental stewardship. The RDQMA utilizes the New York State Cattle Health Assurance Program (NYSCHAP) herd risk assessment model and this model has been adopted for use in all participating states. The USDA is responsible for addressing specific issues such as Johne's Disease, salmonellosis, antimicrobial resistance and mastitis/milk quality. The RDQMA is being considered as the pilot program prior to implementation of a dairy component of the CAHFSE program.	Ongoing. Blood, manure, weekly bulk milk tank samples, environmental samples, management data surveys, economic data, nutrient management data and carcass data are being gathered from 2 farms in the northeastern US. Samples are being analyzed for the presence of Mycobacterium avium spp. paratuberculosis, Salmonella spp., E. coli O157:H7 and generic E. coli, Listeria monocytogenes, Campylobacter, and Enterococci. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Implementation of a dairy pilot program in the Midwest.	Prior to implementation of a dairy component of the CAHFSE program, and in addition to the RDQMA described above, APHIS and ARS have undertaken a pilot study on 5 dairy farms in the midwest for comparison to the RDQMA program. Currently, samples are being cultured for Salmonella, Campylobacter, E. coli and Enterococci, (zoonotic and commensal bacteria). Sera are being banked for future testing. Samples and health/management data are being collected from each farm monthly.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

<u>AGENCY</u>	<u>PROJECT TITLE</u>	<u>DESCRIPTION</u>	<u>STATUS</u>
USDA	Implementation of a poultry pilot program for inclusion in CAHFSE.	Samples will be cultured for Salmonella, Campylobacter, <i>E. coli</i> and Enterococci, (zoonotic and commensal bacteria).	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
** TOP PRIORITY **			
Action Item #5: Develop and Implement Procedures for Monitoring Antimicrobial Use In Human Medicine, Agriculture, Veterinary Medicine, and Consumer Products.			
CDC	Monitoring antimicrobial use in the community and correlating usage with resistance patterns	Analysis of antimicrobial use databases has proven to be complex, requiring sophisticated statistical methods to adjust for the design of certain usage survey samples and requiring substantial medical consultation time to link drug use with appropriate clinical diagnosis codes and potentially with databases regarding resistant infections. This project will develop a core analytic team that will track antimicrobial drug use in the community and correlate results of use with drug-resistance patterns (using drug-resistant <i>Streptococcus pneumoniae</i> as the marker community-acquired respiratory organism) and with community intervention efforts. The team will review availability and appropriateness of antimicrobial use databases and focus on establishing baseline trends in prescribing for upper respiratory infections using the National Ambulatory Medical Care Survey (NAMCS), National Hospital Ambulatory Medical Care Survey (NHAMCS), Medicaid databases, Synergy, and other databases.	During 2006, presented a poster on trends in antibiotic prescribing in ambulatory care settings, 1993-2004, at the 2006 Annual Conference on Antimicrobial Resistance and published a paper on <i>S. aureus</i> -associated skin and soft tissue infections in ambulatory care which included antibiotic use (McCaig et al. JEID November 2006).
CDC	Comprehensive demonstration project: building regional coalitions to prevent methicillin-resistant <i>Staphylococcus aureus</i> in healthcare facilities	This project supports the development and implementation of comprehensive programs to reduce the incidence of MRSA infections in states and/or large regional networks acute phase and nonacute phase healthcare facilities. The Pittsburgh Regional Healthcare Initiative (PRHI) was recruited as a collaborating partner for this project. PRHI is a coalition of regional healthcare facilities and civic, corporate, and healthcare leaders in the Pittsburgh area dedicated to improving the quality of healthcare delivery in southwestern Pennsylvania.	The initial prevention efforts in two area hospitals led to >50% reduction in MRSA infection rate in pilot intervention units. One of the hospitals, the Veterans Affairs Pittsburgh Medical Center, applied the intervention throughout their hospital, and achieved a 49% reduction in MRSA incidence hospital-wide. This success has attracted interest and participation from other healthcare facilities in the region and beyond. Milestones include:
DoD	Prescription databases	Use of the prescription database (PDTS) is being piloted for gastrointestinal and respiratory outbreak detections.	• 17 additional VA hospitals nationwide are now participating in a pilot program to evaluate the reproducibility of the initial results, and the group has elected to use CDC's National Healthcare Safety Network (NHSN) for data collection. Data submission is underway in those hospitals.
FDA	See Action Item #4 (Antimicrobial surveillance plan)	See Action Item #4 (Antimicrobial surveillance plan)	
FDA	See Action Item #2 (Proposed Rule Surveillance/Reporting).	See Action Item #2 (Proposed Rule Surveillance/Reporting).	See Action Item #2 (Proposed Rule Surveillance/Reporting).
FDA	See Action Item #2 (Guidance).	See Action Item #2 (Guidance).	See Action Item #2 (Guidance).

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	CAHFSE, RDQMA, midwestern dairy pilot program and poultry pilot program.	Antimicrobial use information at the farm level is being collected as part of CAHFSE, RDQMA, the midwestern dairy pilot program and the poultry pilot program. Additional information regarding disinfectant use will be initiated in-plant.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
Action Item #6: Identify and Evaluate Methods for Collecting (e.g., Optimal Sampling Methods) and Disseminating the Surveillance Data on Antimicrobial Drug Use.			
CDC	Monitoring Trends in Prescriptions of Antimicrobials in the Alaska Native Health Care System	Prescriptions for antimicrobials in the US on a per-visit basis have declined since the early 1990s for pediatric patients. Widespread publicity about overprescribing and judicious antibiotic use has likely resulted in these changes. In Alaska, where many patients are seen and treated in locations far from a hospital and where substantial delays may occur in transporting ill patients to definitive care, little is known about changes in prescribing rates. We have developed a method for extracting prescriptions from the Indian Health Service datasystem to measure rates of antimicrobial prescriptions over time.	A review of data from the Alaska Native Medical Center in Anchorage revealed that for pediatric patients rates of prescriptions per visit have remained stable from 1992- 2004. The overall visit-based prescribing rate of oral antimicrobials in <18 year olds was lower than rates reported from a similar age group in US. We have expanded the method to include two rural regions of Alaska for comparison. Future plans include inviting other Indian Health Service areas to participate in this activity to obtain a wider look at prescribing practices throughout the IHS system. The data will provide useful feedback for clinical providers and could be used as a QA/AI tool for clinics and hospitals.
FDA	See Action Item #4 (Antimicrobial surveillance plan)	See Action Item #4 (Antimicrobial surveillance plan)	See Action Item #4 (Antimicrobial surveillance plan)
FDA	See Action Item #2 (Proposed Rule Surveillance/Reporting).	See Action Item #2 (Proposed Rule Reporting/Reporting).	See Action Item #2 (Proposed Rule Reporting/Reporting).
FDA	See Action Item #2 (Guidance).	See Action Item #2 (Guidance).	See Action Item #2 (Guidance).
USDA	CAHFSE, RDQMA, midwestern dairy pilot program and poultry pilot program.	As a component of each of the programs, methods are being evaluated and optimized.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
VA	a. Emerging Pathogens Initiative (EPI) b. Review of commercially available computer software to be used for infection prevention, control and containment c. Participation in College of American Pathologists (CAP) standards and the Committee on Laboratory Standards Institute (CLSI).	a. Resistance data are being gathered in the EPI, an automated surveillance system, at the reporting site level and can be used for comparisons based on geographic areas and can be linked to ICD-9-CM diagnostic codes (currently only for inpatients). In addition, drug use data can be linked to laboratory testing and diagnoses for a significant emerging disease. b. VA is actively reviewing computer off-the-shelf software products to assist in infection control processes for prevention and control of infectious diseases including antimicrobial resistant organisms; computer-assisted decision support systems will be a key element in VA's choice of product. c. All VA labs follow CAP standards and are CAP-inspected, as well as are expected to make note of CLSI standards and guidance with reference to antimicrobial susceptibility reporting.	a. This item is already underway in the VHA with reporting from facilities across the country. Enhancements that acquire additional information on antimicrobial resistance of specified organisms were distributed to reporting stations in July 2004. Request for enhancements to capture ICD-9-CM coding from outpatient encounters associated with presence of antimicrobial resistance has been submitted, as has request for ability to delineate differences of data from sites that have consolidated administrative services and reporting mechanisms. b. Commercially available software are being tested in clinical settings including some VA medical centers. c. Ongoing
Action Item #7: Work With Accrediting Agencies To Address Antimicrobial Drug-Use As Part Of Quality Assurance In Health Care Delivery Systems.			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Get Smart: Know When Antibiotics Work- Development and testing of Health Plan Employer Data and Information Set (HEDIS) measures for appropriate antibiotic use	HEDIS is a performance measurement tool used by purchasers and consumers to compare many of the nation's leading health plans. In this project, CDC epidemiologists collaborate with experts in the development and testing of HEDIS measures to develop and test one or more measures of appropriate antimicrobial use in children. Measures include rate of prescribing antimicrobial drugs for acute upper respiratory infections and bronchitis; rate of prescribing antimicrobial drugs for pharyngitis where no throat culture or rapid streptococcal antigen test was performed; and episodes of otitis media treated with a recommended first-line agent. When the measure is incorporated into HEDIS, the measure and its impact on physician and patient awareness of appropriate antimicrobial use will be evaluated. Additionally, two new measures were developed and tested during 2004 for adults; the treatment of acute bronchitis and all upper respiratory infections.	In 2002, (NCQA) was presented with specifications for two potential measures relating to Appropriate Antibiotic Prescribing for Respiratory Infections for Children. Two measures for children were agreed upon, developed and tested following NCQA's specifications. In 2003 these two measures; one on pharyngitis and one on upper respiratory infections were pilot tested. NCQA reviewed and accepted these measures and they were incorporated into the 2004 HEDIS set. The two adult measures were included in the HEDIS set beginning in 2006. The 2006 pilot year of the acute bronchitis measure showed that on average, both Commercial and Medicaid plans showed high rates of inappropriate antibiotic use (66% and 70%, respectively). The antibiotic utilization measure was not approved for public reporting because of the type of information collected (e.g. total number of antibiotics prescribed not broken down by diagnosis); the committee is reassessing how to better use this measure. See http://www.ncqa.org/Programs/HEDIS/index.htm

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #8: Ensure That Clinical Laboratories That Provide Data for AR Surveillance Purposes Have Access to and Routinely Participate in Pertinent Training and Proficiency Testing Programs with Good Performance and Indicate AR Testing Methodologies in Their Surveillance Reports (e.g., Specific Automated Methods or Manual Techniques).			
CDC	The National Laboratory Training Network (NLTN)	The National Laboratory Training Network (NLTN) delivers training around the country on proper methods of antimicrobial susceptibility testing and reporting.	During calendar 2006, Antimicrobial Resistance was the subject of 31 courses reaching more than 14,000 participants. Most of the courses are 5-6 hours long, but the NLTN also presented several nationwide teleconferences on related topics. These courses included a CLSI Standards Update audio conference given by Janet Hindler, attended by more than 9,000 participants. A new modality is being provided in 2007 as "Podcase and Virtual Unknown Antimicrobial Susceptibility Testing" is being introduced. Information is available at www.nltm.org .
CDC	AR research and reference testing	CDC reference laboratory conducts ongoing research and provides selected reference services for susceptibility testing of numerous bacterial species.	Recent achievements include the description of new antimicrobial resistance mechanisms, which has led to modification and improvement of the testing methods used in clinical microbiology laboratories to detect resistance, evaluations of NCCLS/CLSI methods completed and modifications made to improve accuracy, and evaluations of commercial susceptibility testing methods completed and problems noted to the manufacturers. Additional accomplishments include confirmation and investigation of phenotype and genotype of the first seven vancomycin-resistant <i>Staphylococcus aureus</i> isolates in the United States. The Division of Healthcare Quality Promotion led an effort to modify the national vancomycin breakpoints for <i>Staphylococcus aureus</i> to improve the accuracy of identifying <i>S. aureus</i> isolates that have decreased susceptibility to vancomycin.
FDA	Pertinent training	Continue to ensure validity of antimicrobial susceptibility information derived from NARMS.	Developed both an antimicrobial susceptibility testing quality control and quality assurance program for the three arms of NARMS, human, slaughter plants, and retail meat. NARMS also participates in the WHO-Global Salm-Surv External Quality Assurance System (EQAS). The EQAS supports the assessment of the quality of serotyping and antimicrobial susceptibility testing of Salmonella in all participating laboratories.
Action Item #9: Evaluate the Performance of Licensed, Automated AR Testing Devices in the Context of Changing Resistance Patterns and Update Their Labeling When Appropriate (e.g., Changes in Quantitative Resistance That May Make a Test Result Invalid).			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #10: Working with Partners, Including National Committee for Clinical Laboratory Standards (NCCLS), Further Develop, Refine, and Promote Standardized Clinical, Epidemiologic, and Laboratory Methods for Documenting and Assessing the Significance of Drug Resistance Among Yeasts and Moulds, Parasites, and Viruses.			
FDA	In-vitro antimicrobial susceptibility testing	Develop quality control standards for the in-vitro antimicrobial susceptibility testing of bacterial pathogens isolated from aquatic animals and aquaculture foods.	Completed development of standardized in vitro susceptibility testing methods for bacteria isolated from aquatic animals. These methods were incorporated into the Clinical and Laboratory Standards Institute (CLSI) M42-A guideline "Methods for Broth Dilution Susceptibility Testing of Bacteria Isolated from Aquatic Animals", and M49-A guideline "Methods for Antimicrobial Disk Susceptibility Testing of Bacteria Isolated from Aquatic Animals".
FDA	Devices containing antimicrobials guidance	Draft guidance document for industry: how the Center for Devices and Radiologic Health (CDRH) intends to regulate devices containing antimicrobial agents, and what information regarding efficacy and resistance CDRH wants to see in premarket applications (interim until rulemaking is completed).	In development.
FDA	HIV Drug Resistance Genotype Assay Guidance	Revised guidance on HIV Drug Resistance Genotype Assays.	Publication pending.
Action Item #11: Identify Ways To Overcome Economic, Legal, and Other Barriers To Appropriate AR Testing and to the Reporting of Results (e.g. Sufficient Human Resources, Cost Considerations, Empiric Treatment Recommendations, Managed-Care Practices, etc.).			
CDC	Economic modeling of diagnostic and treatment strategies for gonorrhea based on prevalence of antimicrobial resistance	The increasingly widespread use of nonculture methods for gonorrhea diagnosis is a major challenge to monitoring AR in <i>N. gonorrhoeae</i> , especially in light of the emergence of ciprofloxacin-resistant gonococcal isolates from Hawaii (ciprofloxacin is first-line gonorrhea therapy). This project will examine which diagnostic and treatment strategies are more cost-effective when the proportion of <i>N. gonorrhoeae</i> that are ciprofloxacin-resistant is less than 5%: continue to use ciprofloxacin and implement more widespread susceptibility testing, or switch to a more expensive cephalosporin and not increase the scope of susceptibility testing. When completed, the results will help provide a rational basis for programmatic decisions both for selection of gonorrhea treatment and for use of laboratory resources.	Results published in the following article: "Optimizing Treatment of Antimicrobial-resistant <i>Neisseria gonorrhoeae</i> ." Kakoli Roy, Susan A. Wang, and Martin I. Meltzer. Emerging Infectious Diseases. Vol. 11, No. 8, August 2005
Action Item #12: Pursue Legal Mechanisms for Manufacturers To Provide Otherwise Unavailable Drugs to Government Reference Laboratories for the Sole Purpose Of Antimicrobial Drug Susceptibility Testing (as part of surveillance) with the Understanding That These Drugs Will Not Be Used for Drug Discovery Purposes.			
Action Item #13: With State Health and Agriculture Departments and Other Stakeholders, Define Needed Core Capacity (Human, Laboratory, and Electronic Resources) at the State and Local Level To Ensure That Basic AR Surveillance Is Conducted In These Jurisdictions. As Part of This Effort, Ensure That State Public Health and Veterinary Diagnostic Laboratories Maintain the Capacity To Test the Drug-Susceptibility Patterns of Resistant Organisms of Public Health Importance, Especially For Drug-Microorganism Combinations for Which Testing Mechanisms Are Not Routinely Available at Hospital and Commercial Laboratories.			
Action Item #14: Provide Resources To Assist In Meeting State and Local Core Capacity Needs for AR Surveillance. Strive To Provide Consistent Funding from Year to Year to State and Local Health and Veterinary Diagnostic Laboratories That Meet Quality Assurance Standards.			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #15: Provide an Accessible, Centralized Source of AR Data from Major Surveillance Systems Involving Animal and Human Populations. In Consultation with Stakeholders, Determine How To Report AR Data in a Way That Is Valid and Useful to Interested Parties (e.g., Clinicians, Public Health Officials, Veterinarians, and Researchers). Include Sufficient Detail in Surveillance Reports To Permit Local Analysis and Comparison with Trends in Drug Use and Medical and Agricultural Practices.			
CDC, DoD	See Action Item #2 (Gonococcal Isolate Surveillance Project (GISP))	See Action Item #2 (Gonococcal Isolate Surveillance Project (GISP))	See Action Item #2 (Gonococcal Isolate Surveillance Project (GISP))
CDC, FDA, NIH, USDA	See Action Item #2 (Expansion and enhancement of the National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria)	See Action Item #2 (Expansion and enhancement of the National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria)	See Action Item #2 (Expansion and enhancement of the National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria)
DoD	Surveillance for <i>Streptococcus pyogenes</i> among military trainees	Increasing resistance of <i>S. pyogenes</i> to macrolide antibiotics is a concern. Furthermore, during military-recruit training exercises, penicillin-allergic patients are often given erythromycin when mass prophylaxis is recommended. If resistant organisms are present or develop in this population, <i>S. pyogenes</i> infections (latent or overt) may not be treated effectively. Recruits could be reservoirs of resistant pathogens for military populations. This project conducts antimicrobial susceptibility and gene typing on <i>S. pyogenes</i> isolates collected from recruits at 9 military training centers and monitors for <i>S. pyogenes</i> resistance rates.	Ongoing. Reports of susceptibility test results and summary statements are being provided to primary care facilities, are accessible to DoD staff at www.geis.fhp.osd.mil . Generated data show moderate antibiotic resistance through 2006. National DoD surveillance data for antibiotic resistance and emm gene type of group A streptococcal isolates from eight basic-training military sites was published in the Journal of Clinical Microbiology, Vol 48, October 2003. All isolates remain susceptible to penicillin, and macrolide resistance remained steady at approximately 10%. NHRC assisted in <i>S. pyogenes</i> outbreak investigations at 3 recruit training centers in 2006-07. Data from this surveillance was presented to the Defense Health Board (formerly the Armed Forces Epidemiology Board) in December 2006. Additional publication: Crum NF, Russell KL, Kaplan EL, Wallace MR, Wu J, Ashtari P, Morris DJ, Hale BR. Pneumonia outbreak associated with group A Streptococcus species at a military training facility. Clin Infect Dis. 2005 Feb 15;40(4):511-8.
DoD	Multilocus sequence analysis of <i>Streptococcus pneumoniae</i> isolates	DoD data from 1981 to 1991 suggest that <i>S. pneumoniae</i> may cause about 12% of military pneumonia hospitalizations. Multilocus sequence typing characterizes isolates of bacterial species using the sequences of internal fragments of 7 house-keeping genes. This highly discriminatory molecular typing method is used to track the global spread of virulence, to provide a direct comparison of isolates of multidrug-resistant <i>S. pneumoniae</i> , to define serotypes of isolates, estimate recombinational parameters, and identify discrete clonal complexes.	Ongoing. A pneumococcal isolate from a fatal case of meningitis was investigated using this technique, allowing the discovery of a non-vaccine serotype not commonly found among meningitis cases. During 2003 a conjunctivitis outbreak of <i>S. pneumoniae</i> was identified and analyzed. This work enabled the identification of a novel strain responsible for the outbreak and provided epidemiologic information on the causative isolate's resistance pattern. Further analyses of pneumococcal strains from Egypt is in process in hopes of providing valuable epidemiologic data for prevention and treatment options. Publications: Wasfy MO, et al.. Antimicrobial susceptibility and serotype distribution of Streptococcus pneumoniae causing meningitis in Egypt, 1998-2003. J Antimicrob Chemother. 2005 Jun;55(6):958-64. Crum NF, Barrozo CP, Chapman FA, Ryan MA, Russell KL. An outbreak of conjunctivitis due to a novel unencapsulated Streptococcus pneumoniae among military trainees. Clin Infect Dis. 2004 Oct 15;39(8):1148-54.
DoD	Surveillance of <i>Bordetella pertussis</i> among military trainees and the evaluation of newly developed highly sensitive PCR-based beacon probe for the detection of <i>B. pertussis</i>	Whooping cough is a contagious respiratory disease caused by <i>Bordetella pertussis</i> . Studies indicate that it is on the rise in adolescents, adults, and within confined populations such as military trainees. Surveillance for <i>B. pertussis</i> is established at 4 military training centers. Specimens are evaluated using PCR-based beacon probe. Standard culture, serology, and PCR results are compared to validate the accuracy of the PCR method.	Completed. 360 patients with prolonged cough were enrolled. Using culture, serology, and molecular testing, evidence of <i>B. pertussis</i> has been found in 10% of those enrolled.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
DoD	Investigations of methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) outbreaks occurring on military bases.	Hospital acquired MRSA outbreaks are well known, but recent reports have caused concern about community acquired MRSA infections. Investigations into this recent trend have been conducted at several military bases. Laboratory work has involved culture identification followed by antibiotic resistance testing. The presence of the panton valentine leukocidin gene which is a known virulence factor has been shown in many of these investigations. The multilocus sequence typing method has also been used to identify global virulent clones by characterizing the isolates with the sequencing of 7 house-keeping genes. Further molecular analyses have been utilized to discover the specific SCCmec type of these MRSA, which is the mobile genetic element that mediates the methicillin resistance.	Ongoing. Capabilities are in-house when need arises, such as outbreaks or severe illness. At NHRC historical samples from over the last decade were analyzed. Community acquired isolates are now being archived from various military settings. NHRC provides laboratory support for a NMC San Diego study of MRSA in immunocompromised patients. Publications: Crum NF, Lee RU, Thornton SA, Stine OC, Wallace MW, Barrozo CB, Keefer-Norris A, Judd S, Russell KL. 15-Year retrospective study of the changing epidemiology of methicillin-resistant <i>Staphylococcus aureus</i> (MRSA). <i>Am J Med</i> 2006;119(11):943-51. Campbell KM, Vaughn AF, Russell KL, Smith B, Jimenez DL, Barrozo CP, Minarcik JR, Crum NF, Ryan MAK. Risk factors for community-associated methicillin-resistant <i>Staphylococcus aureus</i> infections in an outbreak of disease among military trainees in San Diego, California, in 2002. <i>JCM</i> 2004;42(9):4050-4053. Efforts are underway at BAMC to establish a central repository to collect and establish the molecular epidemiology of strains from military treatment facilities.
DoD	Investigation of multi-drug resistant <i>Acinetobacter baumannii</i> in US service members	<i>Acinetobacter baumannii</i> is an opportunist, with pathogenicity usually associated with high infectious doses or contamination of deep or necrotic wounds. Its importance as a nosocomial agent is due to its high rate of multi-antibiotic resistance. A review of <i>A. baumannii</i> infection in wounded US service persons is underway to determine 1) the number and location of patients involved, 2) what risk factors are common to the patients (eg, military unit or geographic proximity before injury, type and site of wound causing hospitalization, specimen source, type and location of all medical and surgical treatment, exposure to other patients with <i>A. baumannii</i> infection), 3) the phenotypic strain(s) of <i>A. baumannii</i> involved, 4) genotyping of strains currently involved in hospitals at NNMC and WRAMC, and 5) sequencing isolates to conduct molecular epidemiology study with TIGR	Ongoing. Results of investigations are shared with preventive medicine and infectious disease staffs for review and implementation of prevention and control measures. An MMWR article previously was published on this investigation. Other publications: Ecker et al., 2006, <i>J Clin Micro</i> , 44:2921-2926. TIGR MLST typing of outbreak isolates; Turton et al, 2006 <i>J Clin Micro</i> , 44:2630-2635. PFGE comparison of US and UK isolates shows the same genotypes infecting both hospital systems; Hawley et al., 2007, <i>Antimicrob Agents and Chemo</i> , 51:376-381 show changes in resistance patterns of isolates over time which also bears out for 2 major military medical centers receiving patients from Iraq and Iraq itself. Scott et al., 2007, An Outbreak of Multi-Drug Resistant <i>Acinetobacter baumannii</i> -calcoaceticus complex infections in the U.S. <i>Clin Infect Dis</i> , In Press- Describes original investigation of US mil outbreak. The IDCRP is working to make the study of <i>Acinetobacter</i> and other MDRO gram negative bacteria a central research focus.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #16: Provide Healthcare System Administrators and Other Decision Makers with Data on the Impact of Drug-Resistant Organisms (e.g., Outcome, Treatment Costs) and on Effective Prevention and Control Measures.			
AHRQ	Research Demonstration (U18): Centers for Education and Research on Therapeutics (CERTs) program: a national initiative to increase awareness of the benefits and risks of new, existing, or combined uses of therapeutics through education and research.	The University of Pennsylvania Center for Education and Research on Therapeutics has undertaken studies investigating the association between antibiotic use and antibiotic resistance, including the impact of different methods of categorizing prior antibiotic use.	Little attention has been paid to the methods by which prior antibiotic use is defined by agent, class, or the spectrum of activity against different organisms. It is critical to establish whether a resistant pathogen is associated with use of a specific class of antimicrobials or use of agents with certain spectra of activity. A systematic review of the literature and reanalysis of the database from a previous study of risk factors for infections due to extended-spectrum beta-lactamase-producing <i>Escherichia coli</i> and <i>Klebsiella</i> species were conducted. The systematic review revealed tremendous variability across studies in the categorization of prior antibiotic use, with no study justifying its method for categorization. The reanalysis of a past data set also showed great variability across bivariate and multivariate analyses depending on which antimicrobial use categorization--class of agent or spectrum of activity--was employed (MacAdam H et al. Int J Antimicrob Agents 2006;28:325-32.).
Action Item #17: Expand and Enhance Coordination of Surveillance for Drug-Resistance in Enteric Bacteria In Sick and Healthy Humans and in Sick and Healthy Animals on Farms, at Slaughter, and at Retail.			
CDC, FDA, USDA	FDA Science Board Review of the NARMS program	A scientific review designed to help the program identify how it can enhance the coordination among the three arms to provide a more comprehensive look at drug resistance in enteric bacteria has begun. This review will be conducted by the FDA Science Board and a panel of outside experts.	Ongoing: FDA's science board has received the documents for the review, expert panel has been chosen. Public meeting and expert panel discussion with NARMS partners conducted in Laurel, MD, April, 2007. Recommendations to FDA Science Board pending.
CDC, FDA, USDA	Integrated (human, animal, retail) National Antibiotic Resistance Monitoring System for Enteric Bacteria (NARMS) report	An integrated summary of human, animal, and retail meat NARMS data for annual publication	Ongoing: The three arms of the NARMS program are enhancing the coordination of reporting of surveillance data. CDC collects isolates from sick and healthy humans, USDA from sick and healthy animals and FDA from healthy animals via retail meat. The three arms are working together to coordinate common data base management and reporting formats. An integrated 2003 report was published in 2006.
FDA	Antimicrobial resistant bacteria in feed ingredients	Assess the prevalence of antimicrobial resistant bacteria in feed ingredients, primarily rendered product. This work will be done in conjunction with FDA field personnel. Results will be coordinated with NARMS. Expand NARMS into retail foods of animal origin.	Ongoing. Initial surveys of rendered products and plant based proteins completed. Also, see item #2. In addition, see item #17, with regards to antimicrobial resistance bacteria from produce surveys. FDA is also collaborating with USDA to characterize DNA fingerprint patterns and antimicrobial resistance profiles of <i>Salmonella</i> and <i>E. coli</i> obtained from their microbiological data program (MDP) annual produce survey.
Action Item #18: Evaluate the Usefulness of Monitoring Sentinel Human Populations (e.g., Farm, Abattoir, Fruit and Vegetable, and Food Processing Plant Workers) and Persons in the General Community for Infection or Colonization with Resistant Enteric Bacteria.			
CDC	NARMS Enterococci and <i>E. coli</i> surveillance study	Determine the susceptibility patterns for isolates of Enterococci and <i>E. coli</i> isolated from stool samples of healthy persons or outpatients from the community. Determine the risk factors associated with resistant and susceptible bacteria.	Ongoing: Four states are sending isolates of enterococci and <i>E. coli</i> to NARMS CDC lab collected from stool of healthy volunteers or outpatients who report no hospitalization. Interviews are being conducted to determine specific environmental, medical, and food exposures previous to the culture.
FDA	Antimicrobial resistant bacteria in sentinel human populations	Evaluate abattoir workers for carriage of antimicrobial resistant bacterial pathogens.	Ongoing. FDA/CVM funded a cooperative research agreement to the University of Maryland to study antibiotic resistance bacteria in food animals, abattoir workers and human referent groups. The initial pilot study is complete and current efforts are focusing on characterizing enterococcal isolates from poultry farms, retail poultry meats, and humans.
Action Item #19: Conduct Pilot Studies To Assess the Extent of Environmental Contamination by Antimicrobial Drug Residues and Drug-Resistant Organisms That Enter the Soil or Water From Human and Animal Waste. If Contamination is Detected, Conduct Appropriate Surveillance in Waste, Surface and Ground Water, and Soil from Agricultural Areas in Which Waste Is Used for Fertilizer, and Conduct Studies To Determine Potential Impact on Human and Animal Health.			

