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: Campylobacter, *E. coli* O157:H7, Gram negative and Gram positive organisms causing health care associated infections, group A Streptococcus, group B Streptococcus, *Haemophilis influenzae*, *Helicobacter pylori*, HIV, Influenza, Malaria, *Mycobacterium tuberculosis*, *Neisseria gonorrhoeae*, *Neisseria meningitidis*, *Pneumocystis carinii*, Salmonella, Shigella, *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Streptococcus pyogenes*, T*richomonas vaginalis,* 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 anautomated 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 in underway. Five additional sites send enterococci and *E. coli* 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 *Streptococcus pneumoniae*	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 *Streptococcus pneumoniae* (*Spn*). We will provide front-line information concerning established and newly emerging antibiotic resistance mechanisms, clonal types, and serotypes of ABCs *Spn* 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 *Streptococcus pneumoniae*	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 S. pneumoniae 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 trackign 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.

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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 E. coli 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 *E. coli* is the number 2 pathogen causing invasive neonatal sepsis, after group B streptococcus. In 2005, some surveillance areas have a higher incidence of *E. coli* sepsis than GBS sepsis. This is due to declines in GBS sepsis. *E. coli* sepsis incidence appears stable with a trend towards an increased incidence among preterm incidence. An analysis of risk factors for *E. coli* sepsis and for ampicillin-resistance *E. coli* 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 attribuatable 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 *Staphylococcus aureus* [VISA]), and resistance (vancomycin-resistant *Staphylococcus aureus* [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 *Staphylococcus aureus* 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.

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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 Staphylococcus aureus 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 *S. aureus* 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 *Helicobacter pylori* isolates from Alaska Natives	The *H. pylori* 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 *H. pylori* isolates. Determining the resistance profile of *H. pylori* isolates at the individual and regional level is becoming increasingly important in areas of high endemicity where resistance rates tend to be elevated.	*H. pylori* data from from 7/99-6/03 were usded to determine the susceptibility of H. pylori 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. Helicobacter 2006; 11: 581-88.
CDC	An analysis of molecular epidemiology of multi-drug resistant *M. tuberculosis* 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 *M. tuberculosis* (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.

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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 Systemm, 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.

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CDC	Surveillance for drug resistant invasive bacterial diseases in Alaska	The Artic Investigations Program conducts statewide laboratory-based surveillance for invasive *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, and Groups A and B Streptococcus. Surveillance for invasive *H. influenzae* began in 1980, *S. pneumoniae* 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 *E. coli* 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 *E. coli* in selected areas, to evaluate whether antimicrobial drug use during labor and delivery is associated with an increased risk of drug resistant E. coli, 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 adminstration 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 *Candida* 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.

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CDC	Sentinel Surveillance for African Trypanosomiasis Treatment Failure	A resurgence of African trypanosomiasis (sleeping sickness) caused by Trypanosoma brucei gambiense 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 *T. b. gambiense* 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 interpandemic 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 The Lancet on September 22, 2005 [see Bright RA et al., The Lancet, 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 Methicllin-Resistant *Staphylococcus aureus* 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), fomerly 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.

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CDC, DoD	Gonococcal Isolate Surveillance Project (GISP)	Sentinel surveillance system for monitoring antimicrobial resistance of *Neisseria gonorrhoeae* 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 *N. gonorrhoeae* 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. (*Update to CDC's STD Treatment Guidelines, 2006: Fluoroquinolones NO Longer Recommended for Treatment of Gonococcal Infections*. 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 adn 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.

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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.

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Action Item #3: Develop Standards and Methodologies.			
CDC	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 *Staphylococcus aureus* (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 *Staphylococcus aureus* (*S. aureus*) 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 Unversity. Projects underway, results pending. Funding cycle complete. results highlighted in the following: 1) Genetic background affects stability of mecA in Staphylococcus aureus. J Clin Microbiol. 2005 May;43(5):2380-3. 2) Necrotizing fasciitis caused by community-associated methicillin-resistant Staphylococcus aureus in Los Angeles. N Engl J Med. 2005 Apr 7;352(14):1445-53. 3) Incidence of and risk factors for clinically significant methicillin-resistant Staphylococcus aureus infection in a cohort of HIV-infected adults. J Acquir Immune Defic Syndr. 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. Diagnostic Microbiology and Infectious Disease, Volume 52, Issue 3, Pages 235-246. 2) Burgess DS, et. al. Clin Microbiol Infect. 2007: 13(1)33-9. 3) Jorgensen JH, et. al. J Clin Microbiol. 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 *Listeria*	Methodologies and standards for antimicrobial susceptibility testing of *Listeria* are being developed and implemented.	New. A new *Listeria* 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 *Staphylococcus aureus* (VISA/VRSA) with researchers by donating to NIH's Network for Antmicrobial Resistance in *S. aureus* (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 *Salmonella* 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 *Salmonella Paratyphi* study. States submitted all Paratyphi A, B, and C isolates received at their public heatlh 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 *Salmonella* Serotypes	Enhanced surveillance for non-Typhi *Salmonella* 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 *Salmonella* 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 *Streptococcus pneumoniae*	The goals of this project are to estimate the burden of disease caused by *Streptococcus pneumoniae*, 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 islates 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 neoantal 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 *Escherichia coli* and *Staphylococcus aureus*, 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 S. aureus (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 anthelminthic 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 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. Announcemnt of Focus Contract (http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=VANW_VA.story&STORY=/www/story/11-18-2002/0001843012&EDATE=Nove+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, imporve productivity and profitability of dairy farms and encourages environmental styewardship. 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* 0157: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.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Implementation of a poultry pilot program for inclusion in CAHFSE.	Samples will be cultured for Salmonella, Campylobacter, *E. coli* 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 *Streptococcus pneumoniae* 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 *S. aureus* -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 *Staphylococcus aureus* 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 inititated 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.nltn.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 *Staphylococcus aureus* isolates in the United States. The Division of Healthcare Quaity Promotion led an effort to modify the national vancomycin breakpoints for *Staphylococous aureus* to improve the accuracy of identifying *S. aureus* 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 *N. gonorrhoeae*, 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 *N. gonorrhoeae* 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 *Neisseria gonorrhoeae*." 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 *Streptococcus pyogenes* among military trainees	Increasing resistance of S. pyogenes 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, *S. pyogenes* 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 *S. pyogenes* isolates collected from recruits at 9 military training centers and monitors for *S. pyogenes* 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 S. pyogenes 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 *Streptococcus pneumoniae* isolates	DoD data from 1981 to 1991 suggest that *S. pneumoniae* 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 *S. pneumoniae*, 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 *S. pneumoniae* 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 *Bordetella pertussis* among military trainees and the evaluation of newly developed highly sensitive PCR-based beacon probe for the detection of *B. pertussis*	Whooping cough is a contagious respiratory disease caused by *Bordetella pertussis*. Studies indicate that it is on the rise in adolescents, adults, and within confined populations such as military trainees. Surveillance for *B. pertussis* 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 *B. pertussis* has been found in 10% of those enrolled.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
DoD	Investigations of methicillin-resistant *Staphylococcus aureus* (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 MRSAs, 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 Staphylococcus aureus (MRSA). Am J Med 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 Staphylococcus aureus infections in an outbreak of disease among military trainees in San Diego, California, in 2002. JCM 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 *Acinetobacter baumanni* in US service members	*Acinetobacter baumannii* is an opportunist, with pathogenicity usually associated with high infectious doses or contamination of deep or necrotic wounds. Its importance as an nosocomial agent is due to its high rate of multi-antibiotic resistance. A review of *A. baumannii* 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 *A. baumannii* infection), 3) the phenotypic strain(s) of *A. baumannii* 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, J Clin Micro, 44:2921- TIGER MLST typing of outbreak isolates; Turton et al, 2006 J Clin Micro, 44:2630- PFGE comparison of US and UK isolates shows the same genotypes infecting both hospital systems; Hawley et al., 2007, Antimicrob Agents and Chemo, 51:376- show changes in resistance patterns of isolates over time which also bears out for 2 major military medical centers recieving patients from Iraq and Iraq itself. Scott et al., 2007, An Outbreak of Multi-Drug Resistant Acinetobacter baumannii-calcoaceticus complex infections in the U.S, Clin Infect Dis, In Press- Describes original investigation of US mil outbreak. The IDCRP is working to make the study of Aciniobacter 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 Preventic 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 Escherichia coli and Klebsiella 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 cooridnated 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 Salmonella and *E. coli* 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 *E coli* surveillance study	Determine the susceptibility patterns for isolates of Enterococci and E coli 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 *E. coli* 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.			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Defining the role of Salmonella newport in contaminated oysters	Research to test the ability of Salmonella to survive in yosters and to track the source of Salmonella in surface waters	Ongoing. Overall prevalence of 7.4% of Salmonella in oysters with up to 78% in some bays. Majority is one genotype of S. newport. Funded by CSREES, NRI program (Univ of AZ)
USDA	Enhance overall understanding of pathogens that pose a food-safety risk particularly from the environment.	Pilot study to determine the contribution waterways play in moevment of bacteria originating from animal production facilities in particular.	On going: A mobile microbiology trailer has been designed and equipped. In the summer of 2005, collection will start in the southeastern US with the intent to visit all 50 states within the next 5 years. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Enhance overall understanding of pathogens that pose a food-safety risk and to routinely monitor critical diseases in food-animal production, and develop a model for future surveillance efforts on a national level.	CAHFSE will enable USDA to identify and implement mitigation strategies for animal health and food safety issues in a timely manner thereby averting adverse economic, animal well-being, and public health consequences. Further, it will provide comprehensive science based answers regarding animal health and public health, it will serve as a model for future surveillance efforts on a national level, and it will complement information obtained from both the National Antimicrobial Resistance Monitoring System (NARMS) and USDA VetNet programs. These data are being used by the swine industry to develop management recommendations for producers.	Ongoing: This program is being expanded to all commodities and has been endorsed by the Animal Ag Coalition and other commodity groups. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
Action Item #20: Gather Information on the Relationship Between Antimicrobial Pesticide and Herbicide Use and the Emergence of Drug-Resistance by Monitoring.			
Focus Area II: Prevention and Control			
Action Item #21: Identify Factors That Promote or Impede Appropriate Drug Use in Hospitals, Extended Care Facilities, and Outpatient Settings In Collaboration with Partners.			
AHRQ	Independent Scientist Award (K02): Doctor-parent communication and antibiotic over-prescribing	This study focuses on doctor-parent communication as a determinant of both inappropriate antibiotic prescribing and parent satisfaction with care. Parents presenting with their children who were suffering from cold symptoms were recruited for study participation. With informed consent, both physicians and parents were surveyed and their encounters were videotaped. The findings from this work will be used to develop a communication-based intervention to decrease antibiotic over-prescribing in the pediatric outpatient setting.	Physicians were 20.2% more likely to perceive parents as expecting antibiotics when the parents questioned the physician's treatment plan. When physicians perceived parents as expecting antibiotics, the physicians were 31.7% more likely inappropriately to prescribe them. Parents were 24.0% more likely to question the treatment plan when the physician ruled out the need for antibiotics. Parental questioning of the treatment plan increases physicians' perceptions that antibiotics are expected and thus increases inappropriate antibiotic prescribing. Treatment plans that focus on what can be done to make a child feel better, rather than on what is not needed, i.e., antibiotics, may decrease inappropriate antibiotic prescribing (Mangione-Smith R et al. Arch Pediatr Adolesc Med 2006;160:945-52.).
AHRQ	Research Projects (R01): 1. Trial to reduce antimicrobial prophylaxis errors (TRAPE).	1. TRAPE was a four-year group randomized trial to determine whether hospitals randomly assigned to receive comparative feedback and participate in a group collaborative showed greater improvement on five indicators of surgical antimicrobial prophylaxis (AMP) than did the hospitals receiving comparative feedback alone. Forty-four US general medical-surgical hospitals collected detailed information on prophylaxis from 100 randomly selected surgical cases over two time periods. These data were used to calculate performance indicators consistent with published recommendations. After baseline, 22 hospitals were randomly assigned to participate in the collaborative intervention: two in-person meetings with clinical leaders and improvement experts, monthly phone calls to share obstacles and successes, and the promotion of specific process changes. All 44 hospitals provided complete data for both time periods. The change in indicator performance over time was evaluated by generalized estimating equations.	1. The proportion of patients who received a properly timed dose of AMP rose from 74.8% to 85.3% ($p < 0.05$) in the feedback report only group and from 76.3% to 83.2% ($p < 0.05$) in the report plus collaborative group (p for difference = 0.4). The proportion who received prophylaxis for no more than 24 hours post surgery rose from 54.8% to 66.8% ($p < 0.05$) and 51.4% to 69.6% ($P < 0.05$) respectively (p-diff = 0.25). The proportion who received the recommended drug went from 93.4% to 95.4% and 93.7% to 94.7% respectively (p-diff = 0.46). There were no significant differences between groups after stratifying by hospital size or baseline performance. The mean total number of improvement strategies implemented in the report only and report plus collaborative groups were 10.2 (sd=7.5) and 8.5 (sd= 4.9) respectively (ns). Both groups significantly improved in almost all indicators. Participants reported that the effectiveness of improvement strategies was influenced by motivational factors and comparative feedback on performance.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
AHRQ	Research Projects (R01): 2. Improving Antibiotic Use in Acute Care Treatment (IMPAACT) Trial. 3. Implementing Evidence-Based Guidelines for Treating NHAP	2. IMPAACT has examined patient, physician, and hospital factors relating to appropriate antimicrbial use and has tested different types of interventions to improve antimicrobial use in eight emergency departments located across the US. 3. This quasi-experimental study is designed to test the translation of multidisciplinary guidelines on evaluating and treating nursing home-acquired pneumonia (NHAP) into practice in multiple nursing facilities.	2. Antimicrobial overuse is very common in emergency departments, especially for acute bronchitis, and emergency department visits associated with housestaff or trainees get fewer unnecessary antimicrobials (Gonzales R et al. Acad Emerg Med 2006;13:288-94.). A patient and physician educational intervention can reduce overuse of antimicrobials for acute bronchitis, but significant room for improvement remains (Metlay JP et al. Ann Emerg Med, in press.). Emergency department physicians prescribe fewer fluoroquinolones in hospitals with restrictive formularies (Aspinall SL et al. Arch Intern Med, in press.). 3. The timeline for the first three years has been completed, and the intervention is nearing completion. The budget for the third year has been approved and funded. Findings from the baseline study year suggest that guideline compliance is related to nurse and CNA staffing and turnover.
AHRQ	Research demonstration and dissemination project (R18): HIV treatment error reduction using a genotype database	The investigators designed and implemented an automated decision support system for antiretroviral prescribing in conjunction with genotypic resistance test data and assessed the efficacy and usability of the system at the University of Illinois Medical Center in HIV primary care clinics utilizing an electronic medical record system. The prevalence of erroneous prescribing was measured in HIV Insight, a research database in which UIMC HIV patients are entered.	The system was designed and implemented as planned, but utilization was constrained by technical and usability limitations. There was a high rate of errors in antiretroviral prescribing in response to a genotype resistance test: 13% of patients were started on a drug after a resistant test result, and over 40% of patients who were on a resistant drug were kept on that drug for at least 6 months after the resistance test. These errors did not correlate with clinical outcomes as expected (Uy J et al. Antiviral Ther, in press.).
AHRQ	Mentored Clinical Scientist Development Award (K08): Antibiotic use and bacteriuria in the rural nursing home	The focus of this work is antimicrobial resistance among gram-negative urinary isolates and the management of catheter-associated bacteriuria and urinary tract infections in rural nursing homes, for which little is known about management and surveillance practices.	This project consists of two components: a surveillance study that includes a survey of infection control practices (completed), and an observational study of antibiotic resistance among gram-negative urinary isolates from residents of these nursing homes (in data analysis stage). The intervention study uses a computerized decision-support tool at the point of care and is currently ongoing at nursing homes throughout rural Utah. One manuscript is about to be submitted for publication review, and another is in preparation.
FDA	Labeling Rule	The new labeling is intended to educate physicians and the public about the resistance problem and to encourage physicians to prescribe systemic antibacterial drugs only when clinically necessary.	The Final Labeling Rule was published in the Federal Register on February 6, 2003. The rule will go into affect February 6, 2004.Announcement of Labeling Rule (http://fda.gov/bbs/topics/NEWS/2003/NEW00869.html)
VA	Appropriate use of antimicrobials	The VHA has a national formulary, develops and implements care guidelines, and provides extraordinary educational opportunities for staff to deal with questions concerning appropriate use of antibiotics. This is an ongoing activity, but the effort will continue to be enhanced by further collaboration with federal agencies and other partners (including the private sector) since appropriate antibiotic usage involves many components such as physician education, education of the public, appropriate drug advertising, control of over-the-counter antibiotic use, and many other items that require intervention both inside and outside of the federal systems. Local VA facilities pilot and use standardized copmuterized medical records, templating and ordering for medication ordering (including antimicrobials) that incorporate use of clinica pathoways for infectious diseases processes (e.g., pneumonia, peri-operative antimicrobial use) ; these all help to direct providers or care to prefered diagnostic and therapeutic strategies.	Ongoing. Infectious Diseases Field Advisory Committee has representation on the national Antimicrobial Medical Advisory Panel (MAP) for pharmacy. Local sites update pathways and order sets based on local feedback from front line providers and as newer regional and national recommendations are available; also as formulary choices change (either local, regional or national) there updates also can occur.
Action Item #22: Develop Appropriate Drug Use Policies and Evaluate the Impact (Including on Prescribing Patterns, Resistance Rates, Patient Outcomes, and Cost) of Implementing These Policies in Hospitals and Other Health Care Delivery Settings. Identify Ways To Increase Adherence to Appropriate Use Policies Proven To Be Beneficial in Collaboration with Partners.			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	See Action Item #26 (Campaign to Prevent Antimicrobial Resistance in Healthcare Settings).	See Action Item #26 (Campaign to Prevent Antimicrobial Resistance in Healthcare Settings).	See Action Item #26 (Campaign to Prevent Antimicrobial Resistance in Healthcare Settings).
FDA	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).
VA	a. Appropriate use of antimicrobials b. Surgical Site Infection Antibiotic Prophylaxis plan c. Community-acquired pneumonia performance measures	a. The VHA has a national formulary, develops and implements care guidelines, and provides extraordinary educational opportunities for staff to deal with questions concerning appropriate use of antibiotics. b. VHA has introduced surgical site antibiotic prophylaxis (including both timing and appropriateness of choices) as a performance measure for VHA systems nationwide. These performance measures constitute 50% of the annual evaluation for Executive Career Field (ECF) performance plans for VHA regional directors. c. Along with b above, VHA Office of Quality and Performance has initiated quality measures for timing and treatment of community-acquired pneumonia.	a. Ongoing. Infectious Diseases Field Advisory Committee has representation on the national Antimicrobial Medical Advisory Panel (MAP) for pharmacy b. For Federal Fiscal Year 2005, VHA has introduced surgical site antibiotic prophylaxis as a performance measure for VHA systems nationwide--ongoing FY 2007 c. implemented FY 2006 and ongoing
Action Item #23: Evaluate the Relationship Between Prescribing Behavior and Specific Antimicrobial Drug Marketing and Promotional Practices. Assess the Public Health Effects of These Practices in Collaboration with Partners.			
FDA	Direct to Consumer (DTC) Promotion	Review "Direct to Consumer" (DTC) promotion as applies to antimicrobials.	Ongoing.
Action Item #24: Help Individual Hospitals and Healthcare Systems Analyze How the Availability of AR Data and Computer-Assisted Decision Support Systems Influences Prescriber Behavior, Health Outcomes, and Costs. This Plan May Include the Provision of Computer Software and the Establishment of Projects That Involve the Medicare Peer Review Organizations (PROs).			
VA	a. Emerging Pathogens Initiative (EPI) b. AHRQ 1 UC1 HS014237 Toward a Safety Culture: Reducing Nosocomial Infections c. Inpatient Evaluation Center (IPEC) d. Review of commercially available computer software to be used for infection prevention, control and containment	a. Data on antimicrobial resistance with quartile rankings in the VHA nationwide are provided to the Networks, including reporting site-specific data by using the EPI, an automated surveillance system. This will be an ongoing initiative since it is not entirely clear what the best method for AR feedback will be in the final analysis b. VA personnel led a regional research study sponsored by AHRQ designed to look at rapid-cycle implementation strategies of evidence-based practices that are known to reduce health care associated infections. c. The IPEC is a national program to improve outcomes (risk adjusted mortality and length of stay) in VA ICUs and eventually in inpatient care through feedback of outcomes and implementation of evidenced-based practices. d. 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.	a. Ongoing at VA sites across the country. Enhancements that acquire additional information on antimicrobial resistance of specified organisms were distributed to reporting stations in July 2004 b. Primary study accrual has completed and review and reporting of results is ongoing. This regional cooperative project received the 2005 Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Ernest Amory Codman award and demonstrated findings of: i) reduced central line infections by 50 percent. ii) increased adherence to evidence-based practices to 95 percent from 30 percent. iii) created a new model for facilitating improvement as a community, with an increased chance of success, sharing of successful strategies, reducing rework across the sites, and speeding the implementation process. c. Implemented nationwide during FY 2006. d. 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.
**** TOP PRIORITY ****			
Action Item #25: Conduct a Public Health Education Campaign To Promote Appropriate Antimicrobial Use as a National Health Priority. The Health Campaign Should Involve Many Partners.			
CDC	Get Smart: Know When Antibiotics Work on the Farm	Conduct a public health education campaign to promote appropriate antimicrobial use as a national health priority, involving many partners.	Ongoing: There are 10 funded state-based campaigns currently working on state-based projects addressing appropriate antimicrobial use.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC, FDA	"Get Smart: Know When Antibiotics Work" national media campaign	This national media education campaign is being developed to promote appropriate antimicrobial drug use in the community for upper respiratory infections, e.g., to decrease patient requests for antibiotics for illnesses for which they offer no benefit. Target audiences are parents of young children and healthy adults. The campaign uses a variety of health communication materials based on concepts tested in focus groups, and its effectiveness will subsequently be evaluated.	Ogilvy Public Relations Worldwide was awarded the media contract in September 2001 to implement a three phase media plan. Phase I focused on research and development while Phase II culminated with a nationwide launch of the media campaign. The TV PSA generated 86.5 million impressions; the radio PSA 160 million impressions; the print ads were viewed by 185 million; and traffic to the Get Smart website substantially increased (unique visitors jumped from just 4,927 in August 2003 to 28,604 in December 2004). Phase III of the media plan involved continuing the outreach efforts implemented in Phase II. During the final phase, appropriate antibiotic use messages and media were developed and tested for Spanish speaking parents of young children, English speaking healthy adults 21- 49, and American Indian/Native American groups, in an effort to expand the campaign's reach. The new materials were released as part of a media re-launch in early 2005. In FY2006, TV and Radio PSAs were made available for download on the Get Smart website.
CDC	Optimizing antimicrobial use in Emory-affiliated hospitals	Four Emory University-affiliated hospitals began an intervention in 2003 to improve the use of piperacillin/tazobactam.	Four participating hospitals (VA, CLH, EUH, GMH) completed a study during which common interventions to decrease Piperacillin/Tazobactam (PTZ) use were implemented. Preliminary results showed the rate of PTZ use decreased between periods in two of the four hospitals' non-ICUs; VA non-ICU decreased by 13.4% (92.6 to 80.2 DDD/1000 pt-days, $p < 0.001$), and GMH non-ICU decreased by 20.6% (68.3 to 54.2 DDD/1000 pt-days, $p < 0.001$). CLH non-ICU showed no change (32.8 to 33.9 DDD/1000 pt-days, $p = 0.17$), while EUH non-ICU showed an increase (44.2 to 51.8 DDD/1000 pt-days, $p < 0.001$). In the SICUs and MICUs, no significant change in PTZ use occurred. Preliminary conclusions: Interventions may have had an effect on the rate of PTZ use in two of four non-ICU areas. These preliminary results will be used to guide further analysis to find which intervention may have had the most impact.
CDC	Get Smart: Know When Antibiotics Work - multicultural outreach/diversity initiative	Several projects are in development or implementation stages to increase awareness of antibiotic resistance and appropriate antibiotic use among minority communities and those who do not speak English. Projects include: development of educational materials for Spanish-speakers and American Indian/Native American (AI/NA) communities, train-the-trainer sessions with Latino and AI/NA community members, speaking engagements, and development of partnerships to further develop and sustain the initiative.	This initiative and the Get Smart staff member are fully supported by grant funds and in-kind work. The Spanish and AI/NA materials were launched as part of the Phase III media release (see media campaign). The staff member has conducted numerous presentations and train-the trainer sessions with Latino interest associations and the Indian Health Service Community Health Representative members. A contest was conducted in early 2006 among the CHRs to distribute educational materials and appropriate antibiotic use messages to AI/NA audiences. Since early 2005, this initiative has developed 17 new partnerships. In FY 2006, Get Smart worked with the Indian Health Service to disseminate culturally-appropriate messages/tools to American Indian communities. A PHPS Fellow designed an evaluation plan that will assess the multicultural outreach component of the Get Smart campaign.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Get Smart: Know When Antibiotics Work - pharmacy initiative	Several projects are in development or implementation stages to increase awareness among consumers about antibiotic adherence, and to educate pharmacists about counseling consumers/clients on appropriate antibiotic use. Projects include: hospital pharmacist CE program, development of adherence messages for consumers and message placement, statewide activity in Michigan focusing on medication adherence, development of partnerships to develop and sustain initiative.	Hospital Pharmacist CE: In FY05, Get Smart campaign partner, Society of Infectious Diseases, continued development of a CE program for hospital pharmacists to teach about the issue of antibiotic resistance and give tools to communicate with consumers. The program will be hosted online by CE provider, Pharmacy Choice. Antibiotic Roundup: Statewide activity was conducted and evaluated in early 2006 with the support of CDC-funded state program Michigan (MARR), the CDC Foundation, FDA, EPA, Meijer, a Midwest pharmacy chain, Chamberlain Public Relations, and others. The activity began with a statewide media release to kick-off the collection of unused antibiotics. Consumers were given educational materials and a pharmacy store voucher for participating. Over 1,700 prescriptions were collected. A large telephone KAB survey was conducted regarding adherence, yielding that 69% of Michigan residents were exposed to the appropriate use message during the 3-month period.
FDA	See Action Item #23 (Direct to Consumer (DTC) Promotion).	See Action Item #23 (Direct to Consumer (DTC) Promotion).	See Action Item #23 (Direct to Consumer (DTC) Promotion).

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
**** TOP PRIORITY ****			
Action Item #26: In Collaboration with Many Partners, Develop and Facilitate the Implementation of Educational and Behavioral Interventions That Will Assist Clinicians in Appropriate Antimicrobial Prescribing.			
AHRQ	Mentored Clinical Scientist Award (K08): 1. Improving Care for Acute Respiratory Infection. 2. Shared Decision-making and Inappropriate Antibiotic Use.	1. The recipient is developing and implementing an electronic medical record-based template for acute respiratory infection (ARI) visits, the ARI Smart Form. The ARI Smart Form will standardize documentation of care and give clinicians easy access to clinical information, patient-education materials and clinical decision support with a goal of reducing inappropriate antibiotic prescribing. The ARI Smart Form underwent usability testing in Summer 2005 (Linder JA et al. J Biomed Inform 2006;39:648-55), was pilot tested in Fall 2005 (Linder JA et al. In: Kuhn K, Leong TY, Warren J eds. MedInfo2007 Proceedings 2007; in press), and a full randomized controlled trial in some 24 practices took place during the 2005-2006 cold and influenza season (manuscript in preparation). 2. The recipient will develop and validate an instrument to measure shared decision-making in pediatric primary care. This instrument will then be used in a cross-sectional study to examine the relationship of shared decision-making to quality of care outcomes for children's upper respiratory infection.	1. The recipient has published work evaluating the accuracy of electronic antibiotic prescribing in primary care clinics (Linder JA et al. J Am Med Inform Assoc 2006;13:61-6); found subtle differences between competing clinical guidelines for the care of patients with pharyngitis that may undermine a more important message to reduce antibiotic use (Linder JA et al. Arch Intern Med. 2006;166:1374-9); and continued work examining potentially inappropriate antibiotic prescribing for patients with influenza. (Linder JA et al. Pharmacoepidemiol Drug Saf 2005;14:531-6 and Linder JA et al. J Clin Pharm Ther 2006; 31:245-52). 2. The authors hypothesized that sepsis workup recommendations are associated with practice recommendations published during the physician's residency. Multivariable regression with piecewise linear functions evaluated workup recommendations by timing of literature recommendations during residency. Pediatricians recommended sepsis workups 81.6% of the time and family physicians 67.7%.
CDC	Get Smart: Know When Antibiotics Work-Development and distribution of evaluation manual for programs promoting appropriate antibiotic use in the community	CDC distributes funds to state and local health departments to develop local campaigns to promote appropriate antibiotic use, and all funded sites are required to include an evaluation component. However, with limited resources, the vast majority of sites do not adequately evaluate the success of their work. In addition, our grantees have repeatedly requested assistance in planning and implementing these evaluations. Data gathered during evaluation enables managers and staff to create the best possible programs, identify lessons learned, make modifications as needed, monitor progress toward program goals, and judge the success of the program in achieving its short-term, intermediate, and long-term outcomes.	During FY 2004, meetings with the evaluation manual working group focused on reviewing manual content, coordinating writing styles, and planning for the completion and distribution of the manual. Completed drafts of two appropriate antibiotic use case studies, sent them to program coordinators of some of our funded sites to solicit feedback, and revised the case studies accordingly. The manual was finalized and cleared in fall 2005. The manual underwent final revisions and proofreading in early 2006 and was released to all CDC-funded state programs and other interested parties in April 2006 via electronic message board, Epi X. Due to limited funds, a hard copy of the manual has only been provided to 2 sites, although we plan on providing them to all sites in FY2007. The manual is available for download on the Get Smart website.
CDC	Get Smart: Know When Antibiotics Work on the Farm	In collaboration with many partners, develop and faciliatate the implementation of educational and behavioral interventions that will assist clinicians in appropriate antimicrobial prescribing.	Ongoing: There are 10 funded state-based campaigns currently working on state-based projects and interventions addressing appropriate antimicrobial use.
CDC	Campaign to prevent antimicrobial resistance in healthcare settings	The Campaign to Prevent Antimicrobial Resistance in Healthcare Settings (the Campaign) was launched in March 2002. The Campaign's overall goal is to reduce antimicrobial resistance (AR) by decreasing inappropriate antimicrobial use and improving adherence to proven infection control precautions. Five 12-step Programs with evidence-based action steps have been developed to target physicians who provide care to the following populations: hospitalized adults, dialysis patients, surgical patients, hospitalized children, and long-term care residents. Didactic tools and materials also have been developed and tested and accompany each of the 12-step Programs to promote the implementation of the recommended steps. In addition, materials have been developed that focus on the prevention of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA).	Major 2006 activities: 1) Funded seven states through the Epidemiology and Laboratory Capacity (ELC) mechanism to conduct educational activities to prevent AR in healthcare settings and CA-MRSA. 2) Collaborated with the Council for State and Territorial Epidemiologists to conduct an assessment of health department needs for CA-MRSA educational materials. 3) Collaborated with the National Athletic Trainers' Association to conduct an assessment of athletic trainers' knowledge, attitudes, and practices regarding MRSA. 4) Developed an information sheet with questions and answers for patients diagnosed with a S. aureus or MRSA infection. 5) Developed and pilot tested two sets of posters to educate the public about MRSA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	Get Smart: Know When Antibiotics Work-Medical professional curricula promoting appropriate use of antibiotics	Developing and promoting three appropriate antibiotic use curricula for providers: 1. Curriculum for medical students regarding appropriate antibiotic use. Topics include extent of antibiotic resistance, diagnostic techniques, and appropriate antibiotic use. Case studies focus on diagnosis, treatment, and provider-patient communication. This course is designed to meet the needs of a variety of medical schools with components that can be used separately or as a whole. 2. Curriculum for primary care residents on appropriate antibiotic use based on the medical school curriculum. 3. Curriculum for family practice and pediatric residents for diagnosing otitis media.	1) Medical school curriculum, ongoing: CDC and the University of California, San Diego developed and produced a multi-faceted educational curriculum in 2000-2001, which was then pilot tested during the 2002-2003 school year at six medical schools in collaboration with the Association of American Medical Colleges (AAMC). The curriculum is intended to be distributed nationally during summer 2007. 2) Primary care residents curriculum, ongoing: The Oregon Health and Science University developed a curriculum for primary care residents based on the medical school curriculum. The study team extended the pilot testing phase of the project due to difficulties recruiting primary care residents for testing. After testing and refinement, the curriculum will be used in additional Oregon programs, and later made available nationally. 3) Otitis media curriculum, ongoing: The Children's Hospital of Pittsburgh is developing a curriculum for family practice and pediatric residents to improve training in the diagnosis and treatment of otitis.
CDC	Get Smart: Know When Antibiotics Work - Influenza antiviral education for physicians and patients (in collaboration with the Influenza Division)	Develop and promote educational materials for providers and patients about recognizing flu and appropriate use of antivirals, which will in turn decrease inappropriate use of antibiotics. This will consist of evaluating the effectiveness of materials and key messages; conducting focus groups, surveys, and in-depth interviews, and incorporating key messages into web and print materials.	A contract has been awarded to the Academy for Educational Delopment to conduct this project with oversight from CDC. All research will take place between June - August 2007. New materials will be available by Fall 2007.
CDC	Reporting antimicrobial susceptibility data to clinicians	Assist CLSI to produce guidelines for clinical microbiology labs on how to compile and report summaries of cumulative antimicrobial susceptibility data (antibiograms) in a standardized manner to aid in clinical decisions. When completed and evaluated, standard reports should improve empiric prescribing, based on data of antimicrobial susceptibility testing and allow comparisons of data among hospitals.	Ongoing. CDC worked with NCCLS/CLSI to developed better reporting guidelines. Multicenter study showed significant problems in reporting of antimicrobial susceptibility testing results of positive blood cultures. Educational programs to improve reporting practices were conducted in multiple healthcare institutions and repeat proficiency testing to document improvement in practice in now ocurring. A document to improve presentation of antimicrobial resistance data was approved in 2007.
FDA	See Action Item #23 (Direct to Consumer (DTC) Promotion).	See Action Item #23 (Direct to Consumer (DTC) Promotion).	See Action Item #23 (Direct to Consumer (DTC) Promotion).
FDA	See Action Item #25 (Education/Outreach Plan) .	See Action Item #25 (Education/Outreach Plan) .	See Action Item #25 (Education/Outreach Plan) .
VA	Prudent use of antibiotics interventions	The VHA is already involved in many of these activities with particular emphasis on educational activities and training for prescribers at all levels, including physicians, nurse practitioners, and others who are involved with the direct care of patients. Particularly, the VHA provides a strong role in education for health professions students, medical and nursing trainees, and others critical to the provision of care to patients such as social workers, psychologists, and advanced role nurses. In addition, the VHA has produced guidelines, including those that relate to antimicrobial drug use. Therefore, the VHA is well underway for this action item.	Ongoing
VA	Review of commercially available computer software to be used for infection prevention, control and containment	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.	Commercially available software are being tested in clinical settings including some VA medical centers

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
VA	Performance measures for surgical antibiotic prophylaxis and antibiotic therapy for community-acquired pneumonia have been rolled out within the last year or are in process.	VHA Office of Quality and Performance has instituted nationwide measures related to antibiotic prescribing regarding timing of antibiotic prophylaxis relative to surgical procedures. Additionally, plans are in process to gather performance data on use of appropriate antibiotics relative to surgical prophylaxis, as well as with regard to treatment of hospitalized patients with community-acquired pnemonias.	Office of Quality and Performance measures began implementation in FY 2005 and continue through FY 2006 with plans for additional measures in FY 2007.
VA	Development of national ICU inpatient evaluation center (IPEC)	The IPEC is a national program to improve outcomes (risk adjusted mortality and length of stay) in VA ICUs and eventually in inpatient care through feedback of outcomes and implementation of evidenced-based practices. Currently two of the initiatives deal with issues related to infection prevention--catheter-related bloodstream infections and ventilator-associated pneumonias--both of which may involve resistant organisms These data are reported back immediately to the local facilities who can track their rates over time and compliance with performance, as well as see the national mid-range statistical analysis results.	IPEC program initiated nationwide during FY 2006 with initial data demonstrating a decrease in ventilator-associated pneumonias and central catheter related bloodstream infections nationwide within the past year.
VA	National MRSA Prevention Initiative	In January 2007 VHA administration took strong directive action in plan to address infection with MRSA nationwide as a prototype agent for multidrug resistance issues; this national plan employs a bundle approach which includes hand hygiene, contact precautions, active surveillance culturing and cultural change.	Initiated FY 2007 (all acute care facilities to have at least one unit active in program by March 15, 2007, with addition of other acute care units as quickly as feasible thereafter.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #27: Explore Ways To Integrate Appropriate Use Information into Antimicrobial Package Inserts and Promotional Materials, To Provide Such Information to Patients with Each Prescription, and To Provide Clear Guidance to Industry To Ensure That Promotion of Antimicrobials Directed Towards Consumers Encourages Appropriate Use and Discourages Inappropriate Use.			
CDC	Get Smart: Know When Antibiotics Work - pharmacy initiative: patient monograph project	In 2005, Get Smart developed a partnership with Catalina Health Resource, the largest distributer of prescription packaging advertising in the U.S. The antibiotic adherence message developed as part of the Pharmacy Initiative has and will be placed as ads with antibiotic prescriptions nationwide.	During fall 2005, the Get Smart adherence PSA ran for 6 weeks nationally, due to donations of space from Catalina Health Resource. 13,000 pharmacies were reached along with over 1.25 million people, valuing $1.4 million in advertising cost. A larger scale paid campaign took place in fall 2006, from partner donations received through CDC Foundation. Catalina Health Resource completed a second campaign in Michigan to compliment the Roundup pilot program, lasting 3 months (January 2006-April 2006) in Michigan pharmacies, with nearly 350,000 impressions statewide.
FDA	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).
Action Item #28: Articulate Factors That Support the Current Approach of Requiring Prescription-Only Dispensing for All Systemic (e.g., Nontopical) Antimicrobial Drugs Used In Clinical Medicine.			
Action Item #29: Periodically Review and Update Antimicrobial Drug Susceptibility Information Including In Drug Labeling, with Input from Stakeholders and Other Experts, e.g., the National Committee for Clinical Laboratory Standards (NCCLS) and CDC.			
FDA	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).
Action Item #30: Convene an Advisory Panel or Other Expert Group in Involving Stakeholders and Partners To Consider Issues Related to Resistant Pathogens That Cause Serious Infections for Which Available Treatments Options Are Very Limited or Nonexistent.			
FDA, CDC, NIH	Antimicrobial Drug Development Public Workshop (sponsored by FDA, IDSA and ISAP)	Workshop provided information for and gained perspective from advocacy groups, industry and others on various aspects of antimicrobial drug development, including clinical trial design issues.	Workshop held April 15-16, 2004. Discussed the use of pharmacodynamic information in appropriate dose selection in clinical trials of anti-infective agents, and summarized the issues with developing antimicrobial drugs by allowing data from one serious disease to be supportive of data in another less serious disease such that sponsors would only have to perform one trial instead of two in the less serious disease. CDER resistance web site to access workshop transcripts (http://www.fda.gov/cder/drug/antimicrobial/default.htm)
CDC	Experts Meeting: community-onset methicillin-resistant *Staphylococcus aureus* : implications for antimicrobial therapy and potential prevention strategies	These funds will be used to convene a two day meeting of approximately 20-25 experts and stakeholders to discuss issues surrounding the diagnosis, treatment, and prevention of community-associated MRSA infections (CA-MRSA). Participants will include clinical experts and epidemiologists from academic institutions and public health agencies with expertise in community associated MRSA and other Staphylococcal infections, as well as representatives from relevant professional societies (e.g. IDSA, Pediatric ID Society) and potentially representatives from other stakeholder organizations (schools, daycare, athletic associations). Expected products resulting from the meeting include proceedings and plans for guidance documents for clinicians and others on diagnosis, treatment, and prevention strategies for CA-MRSA infections.	A detailed summary of strategies for the clinical management of MRSA in the community, based on discussions held at this meeting, in conjunction with additional data available as of January 2006, is available in pdf format on the CDC website: http://www.cdc.gov/ncidod/dhqp/ar_mrsa_ca_04meeting.html
FDA	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).	See Action Item #21 (Labeling Rule).
FDA	Otitis Media Advisory Committee	Discussion of clinical study design for drugs treating acute otitis media (which may impact resistance in the pediatric population).	Meeting held on July 11, 2002. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder02.htm#Anti-Infective
FDA	FDA/PhRMA Co-Sponsored Workshop	Discussion of statistical issues in clinical trials including trials related to resistant pathogens.	Meeting held on November 9, 2002.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
FDA	FDA/IDSA/PhRMA Co-Sponsored Public Workshop	Coordinated and hosted a public workshop that brought together top national leaders and scientists from the Infectious Disease Society of America, Pharmaceutical Research and Manufacturers of America, and U.S. academic institutions along with representatives from CDC and NIH to address current topics of interest associated with AR and antimicrobial drug development.	Meeting held on November 19-20, 2002. CDER resistance web site to access workshop transcripts (http://www.fda.gov/cder/drug/antimicrobial/default.htm)
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of issues relating to macrolide-resistant Streptococcus pneumoniae (MRSP).	Meeting held on January 24, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of issues relating to AR in *Streptococcus pneumoniae*.	Meeting held on March 4, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of a list of Antimicrobial Resistant Pathogens of Public Health Importance to assist stakeholders in the development of antimicrobial drugs related to resistant pathogens.	Meeting held on May 5, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective
FDA	FDA/NIAID Co-Sponsored Public Workshop	Coordinated a public workshop with the National Institute of Allergy and Infectious Diseases, which brought together top scientists to discuss issues affecting antifungal drug development for febrile neutropenia and combination antifungal therapy.	Meeting held on September 4, 2003.
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of clinical trial design issues for demonstrating the safety and efficacy of antibacterials in the treatment of diabetic foot infections.	Meeting held on October 28, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of clinical trial design issues for studies in acute bacterial sinusitis.	Meeting held on October 29, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective
VA	a. Appropriate use of antimicrobials b. National MRSA Summit and MRSA Implementation Task Force	a. The VHA has a national formulary, develops and implements care guidelines, and provides extraordinary educational opportunities for staff to deal with questions concerning appropriate use of antibiotics. This is an ongoing activity, but the effort will continue to be enhanced by further collaboration with federal agencies and other partners (including the private sector) since appropriate antibiotic usage involves many components such as physician education, education of the public, appropriate drug advertising, control of over-the-counter antibiotic use, and many other items that require intervention both inside and outside of the federal systems. b. National MRSA Summit with VA and non-VA experts to come to concensus on implementation. This Summit was used to compliment much work done by the National MRSA Prevention Initiative Implementation Task Force; it also helped to determine future issues for the Task Force and National Program Office.	a. Ongoing. Infectious Diseases Field Advisory Committee has representation on the national Antimicrobial Medical Advisory Panel (MAP) for pharmacy b. Held May 2-3, 2007; work of Implementation Task Force will be ongoing
Action Item #31: Convene A Working Group To Examine the Impact of Federal Reimbursement Policies for Home Parental Antimicrobial Treatment, Appropriate Antimicrobial Use, and Appropriate Use of Antimicrobial Susceptibility Testing. Where Needed, the Working Group Will Make Recommendations for Modifying These Policies.			
Action Item #32: Develop and Submit Measures for Appropriate Antimicrobial Use to the National Committee for Quality Assurance for Inclusion in Health Plan Employer Data and Information Set (HEDIS), Which Provides Comparative Data on Managed Care Organizations			
CDC	See Action Item #7: Get Smart: Know When Antibiotics Work-Development and testing of Health Plan Employer Data and Information Set (HEDIS) measures for appropriate antibiotic use	See Action Item #7: Get Smart: Know When Antibiotics Work-Development and testing of Health Plan Employer Data and Information Set (HEDIS) measures for appropriate antibiotic use	See Action Item #7: Get Smart: Know When Antibiotics Work-Development and testing of Health Plan Employer Data and Information Set (HEDIS) measures for appropriate antibiotic use

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
VA	a Surgical Site Infection Antibiotic Prophylaxis plan b. Community-acquired pneumonia treatment	a. VHA has introduced surgical site antibiotic prophylaxis as a performance measure for VHA systems nationwide. These performance measures constitute 50% of the annual evaluation for Executive Career Field (ECF) performance plans for VHA regional directors. The particular performance measures relative to surgical site infection antibiotic prophylaxis include percent of the cases the drug began timely, percent of the cases the appropriate drug was given, and percent of the cases the drug was discontinued timely. b. VHA Office of Quality and Performance has also added community-acquired pneumonia treatment timing measures and in pursing appropriate antibiotic choice measures.	a. For Federal Fiscal Year 2005, VHA has introduced surgical site antibiotic prophylaxis as a performance measure for VHA systems nationwide. Refinement with possible additional measure of appropriate antibiotic choices being evaluated for FY 2007 b. During FY 2006 these measures have been introduced and are being refined, with additions planned FY 2007
Action Item #33: Evaluate The Potential Impact Of Improved Diagnostic Tests, Including Rapid Point-of-Care Tests on Antimicrobial Drug Use and Patient Care, and Assess Their Financial Implications. Take into Account Tests That Distinguish Between Bacterial and Viral Infections, Tests That Identify Resistant Pathogens, and Tests That Distinguish Common Clinical Entities such as Bacterial Sinusitis and Acute Bacterial Otitis Media from Illnesses with Similar Manifestations for Which Antimicrobials Are Not Beneficial.			
AHRQ	Research career award (K08): randomized trial of sinus CT for acute sinusitis.	This investigator at the University of Washington will develop and implement a randomized controlled study assessing the impact of sinus CT on the use of antibiotics for patients with acute sinusitis. She will also assess clinical outcomes as well as downstream costs related to acute sinusitis. She will develop and validate clinical prediction rules through the randomized clinical trial.	Enrollment into the study continues at the various recruitment sites. At the end of April enrollment stood at 64 patients. Opening the follow-up outcome data and cost data await completion of the randomized controlled trial.
Action Item #34: Identify Economic and Other Barriers in the Health Care System (e.g., Reimbursement Policies by Third Party Payers, Managed Care Practices, Cost Considerations, Empiric Treatment Recommendations, etc.) to Diagnostic Testing That Promotes Appropriate Use of Antimicrobials. Develop Recommendations That Remove Disincentives or Promote Incentives to Such Testing.			
VA	Laboratory accreditation	The VHA currently participates in surveys by the College of American Pathologists and all VHA laboratories are appropriately credentialed, as well as are expected to make note of CLSI standards and guidance with reference to antimicrobial susceptibility reporting.	Ongoing.
Action Item #35: In Collaboration With Professional Societies, Industry, Health Departments, And Other Stakeholders And Partners, Develop Guidelines for Clinicians And Clinical Microbiology Laboratories To Address Appropriate Specimen Collection, Interpretation, And Reporting Of Susceptibility Tests, And Use Of In-Office Tests For Infection.			
Action Item #36: In Collaboration with Professional Societies, Industry, Health Departments, and Other Stakeholders, Develop Guidelines That Address the Use of Clinical Microbiology Laboratories for Use by Health Care Delivery Organizations.			
Action Item #37: Promote the Increased Performance of Direct Examination of Microbiological Specimens (e.g., by Gram Stain or Other Rapid Method) in Circumstances Where Appropriate, Clinically Relevant, and Reliable Information Can Be Garnered, as Readily Available Point-of-Care Diagnostic Test. This Step Will Require Working Within the Framework of the Clinical Laboratory Improvement Amendment (CLIA) Regulations and Involving Medical Education And Health Care Delivery Organizations.			
Action Item #38: Identify Factors That Promote Transmission of Drug-Resistant Pathogens in Healthcare Facilities, in Extended Care Facilities, and in Community Settings, Including Daycare Centers in the Community at Large. These May Include Characteristics of the Facilities and of the Populations They Serve.			
CDC	See Action Item #3: Grant program for applied research on antimicrobial resistance: Characterization of strains of Community-Associated Methicillin-Resistant *Staphylococcus aureus* (CA-MRSA)	See Action Item #3: Grant program for applied research on antimicrobial resistance: Characterization of strains of Community-Associated Methicillin-Resistant *Staphylococcus aureus* (CA-MRSA)	See Action Item #3: Grant program for applied research on antimicrobial resistance: Characterization of strains of Community-Associated Methicillin-Resistant *Staphylococcus aureus* (CA-MRSA)

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
CDC	See Action Item #39 (Centers of Excellence in Healthcare Epidemiology).	See Action Item #39 (Centers of Excellence in Healthcare Epidemiology).	See Action Item #39 (Centers of Excellence in Healthcare Epidemiology).
VA	Long term care infection surveillance	A national VA taskforce developed a prototype web-based point prevalence survey which was subsequently beta-tested and used for the actual survey. CDC-based definitions of infections were used. Long term plans are to develop and improve standardized infection surveillance of VHA nursing homes. Develop a nursing home care educational session for use with VHA nursing home care units.	National nursing home survey was completed in Fall 2005. Data analysis and review are ongoing, with report released by the Office of the Inspector General. Publication of article in Am J Infect Control. 2006 Mar;34(2):80-3. Ongoing evaluation of surveillance methodologies and standards are actively being pursued, along with development of education session(s) for use by personnel within VHA nursing home care units (e.g., conference which may be multi-purposed with development of web-based sessions/components from this).
**** TOP PRIORITY ****			
Action Item #39: Evaluate the Effectiveness (Including Cost-Effectiveness) of Current and Novel Infection-Control Practices for Health Care and Extended Care Settings and in the Community. Promote Adherence to Practices Proven To Be Effective.			
AHRQ	Task Order: Testing Techniques to Radically Reduce Antibiotic-resistant Bacteria (Methicillin-resistant Staphylococcus aureus, or MRSA).	The overall purpose of this task order is to measurably reduce hospital-acquired MRSA infections in acute-care facilities or hospitals and document how this was done, in order to help others achieve success in similar settings.	Intervention, trarining, and assessment activities are underway at the collaborating sites. A paper on the design of the electronic regional infection control network has been accepted for presentation at the International Medical Informatics Asscіation Meeting (MedInfo).
CDC	Centers of Excellence in Healthcare Epidemiology (Prevention Epicenters)	Academic medical centers conduct research to improve infection control practices. Current projects address improving antimicrobial use in acute care facilities, the epidemiology of transmission of resistant organisms in the ICU setting, and exploring novel approaches to preventing transmission	Recent activities include: 1) completed a multi-center evaluation of the use of novel approaches to routine skin antisepsis (daily chlorhexidine baths) to reduce transmission of antimicrobial resistant organisms among patients in intensive care units. Manuscript submitted for publication.2) Completed a multi-center intervention using post-prescription review as a method of promoting rational antimicrobial use. Preliminay results presented in 2005, final analysis and manuscript preparation pending. 3) Completed a multi-center study that determined baseline incidence of methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant enterococcus (VRE) transmission in 12 intensive care units (ICUs) in five hospitals. The study demonstrated that active surveillance cultures increase detection of MRSA and VRE colonization in ICUs by up to 49%. Results published early 2007. 4) CDC recently completed competitive renewal of the Prevention Epicenter Program, and the new Prevention Epicenters began their work in February 2006.
CDC	See Action Item #63 (Comprehensive Demonstration Project: building regional coalitions to prevent methicillin-resistant *Staphylococcus aureus* (MRSA) in healthcare facilities)	See Action Item #63 (Comprehensive Demonstration Project: Building Regional Coalitions to Prevent Methicillin-Resistant *Staphylococcus aureus* (MRSA) in Healthcare Facilities)	See Action Item #63 (Comprehensive Demonstration Project: Building Regional Coalitions to Prevent Methicillin-Resistant *Staphylococcus aureus* (MRSA) in Healthcare Facilities)
VA	Six SigmaTM process to promote hand hygiene in VA medical facilities.	National VA effort to use the Six SigmaTM process in the hand hygiene promotion effort. Pilot project at 3 VA medical facilities, with products from the testing to be distributed nationwide to all VA medical facilities.	Six Sigma process regarding hand hygiene being tested at 3 VA medical facilities. Publshied as "Using the six sigma process to implement the Centers for Disease Control and Prevention Guideline for Hand Hygiene in 4 intensive care units." J Gen Intern Med. 2006 Feb;21 Suppl 2:S35-42. with authors Eldridge NE, Woods SS, Bonello RS, Clutter K, Ellingson L, Harris MA, Livingston BK, Bagian JP, Danko LH, Dunn EJ, Parlier RL, Pederson C, Reichling KJ, Roselle GA, Wright SM.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
VA	Methicillin-resistant Staphylococcus aureus patterns in VA.	S. pneumoniae laboratory data collected nationwide from VA medical facilities to identify antibiotic resistance patterns.	Abstracts presented at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2007, Baltimore MD authors: G Roselle, S Kralovic, L Simbartleabout MRSA, at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2006, Chicago, IL authors: S Kralovic, L Danko, L Simbartl, G Roselle about MRSA, at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2005, Los Angeles, CA authors: S Kralovic, L Danko, L Simbartl, G Roselle about Clostridium difficile
VA	Antibiotic Resistance and Extended Spectrum Beta-lactamase (ESBL) Activity in VA: A Two-year Review.	Antibiotic resistance and ESBL activity data collected from VA medical facilities nationwide.	Abstract presented at the International Conference on Emerging Infectious Diseases, 2004, Feb 29-Mar 3, 2004, Atlanta, GA. Authors: GA Roselle, SM Kralovic, LH Danko, LA Simbartl, LB Rice.
VA	AHRQ 1 UC1 HS014237 Toward a Safety Culture: Reducing Nosocomial Infections	VA personnel led a regional research study sponsored by AHRQ designed to look at rapid-cycle implementation strategies of evidence-based practices that are known to reduce health care associated infections	Primary study accrual has completed and review and reporting of results is ongoing. This regional cooperative project received the 2005 Joint Commission on Accreditationof Healthcare Organizations (JCAHO) Ernest Amory Codman award and demonstrated findings of: i) reduced central line infections by 50 percent. ii) increased adherence to evidence-based practices to 95 percent from 30 percent. iii) created a new model for facilitating improvement as a community, with an increased chance of success, sharing of successful strategies, reducing rework across the sites, and speeding the implementation process.
VA	Toyota Production System (TPS) process to reduce infection	Through a demonstration project sponsored by CDC, VA facilities in Pittsburgh along with other health care institutions in the region participated in evaluation of a methodology (Toyota Production System process) for implementing change in infection control practices.	Has demonstrated decrease with sustained success in resistant Staphylococcus aureus within facility Abstract presented at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2006, Chicago, IL authors R Muder, E McCray, C Cunningham, P Perreiah, C Squier, R Sinkowith-Cochran, J Jernigan. Ongoing
VA	Positive Deviance model	Use of Postiive Deviance model to assist with national MRSA Prevention Initiative.	Abstracts demonstrating use of positive deviance for cultural change at the Pittsburgh VA as part of its' successful MRSA reduction efforts presented at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2007, Baltimore, MD authors R. muder, C Cunningham, S. squier, E McCray, R Jain, R sinkowitz-Cocharn, J Lloyd, J Jernigan on the first abstract and J Jacob, R Muder, C Cunighham, E McCray, C Squier, C Mehta, R Jain, R Sinkowitz-Cochran, J Llyod and J Jernigan on the second abstract Ongoing
Action Item #40: Evaluate the Cost-Effectiveness and Impact on Patient Care and Drug Resistance of Medical Devices That Incorporate Anti-Infective Compounds To Prevent Infection (e.g., Anti-Infective Urinary Catheters and Prosthetic Heart Valves). Where Appropriate (e.g., Shown To Be Effective and Not Induce Resistance), Encourage the Clinical Use of These Devices.			
FDA	Devices containing antimicrobials – draft guidance	Draft guidance document for industry: how CDRH intends to regulate devices containing antimicrobial drugs, and what information regarding efficacy and resistance CDRH wants to see in premarket applications (interim until rulemaking is completed).	In development.
FDA	Standards development seminar	Standards development: seminar to gather information from experts on developing test methods that should/could be used to demonstrate efficacy of antimicrobial agents on devices for use in guidance and rulemaking.	Seminar held on December 3-4, 2001.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #41: Encourage the Development and Implementation of Clinical Alternatives to Those Invasive Medical Procedures That Increase the Risk of Infection in Hospitals and Other Health Care Settings, e.g., Substitutions of Transcutaneous Monitoring of Blood Oxygen Levels of Indwelling Catheters.			
Action Item #42: Evaluate the Benefits and Risks of Incorporating Antimicrobial, Disinfectant, or Antiseptic Chemicals into Consumer Products (e.g., Soap, Toys, Kitchen Utensils, Clothes, Paints, Plastics, and Film Preservatives) and of Applying Disinfectants and Sanitizers to Hard, Non-porous Surfaces such as Food-Contact Surfaces, Hospital Premises, Bathrooms, etc. Consider Whether They Have Any Efficacy in Reducing and/or May Play a Role in Promoting Drug Resistance.			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #43: Conduct a Public Health Campaign To Promote Hand Hygiene and Other Hygienic Practices, as well as Other Behaviors That Prevent the Transmission of Infectious Organisms, in Collaboration with Professional Societies and Stakeholders. This Campaign May Be Coordinated with the Public Health Education Strategy To Promote Appropriate Antimicrobial Use Described in Action Item #25: Prevention and Control.			
CDC	"It's a SNAP" handwashing campaign	CDC is collaborating with the Soap and Detergent Association to launch the second year of an education-based effort for middle level school communities to improve health by making hand cleaning an integral part of the school day.	Ongoing. Vist SNAP at: http://www.itsasnap.org/index.asp
VA	a. Required Hand Hygiene Practices Directive VHA Directive 2005-002 b. Six Sigma™ Process to promote hand hygiene in VA medical facilities c. Infection -Don't Pass It on Campaign d. National MRSA Prevention Initiative	a. National directive which provides guidance for establishing the basic requirements for hand hygiene practices in VHA facilities. A hand hygiene policy (conforming to the Category IA, IB, and IC recommendations presented in the CDC Guideline for Hand-Hygiene in Health-Care Settings [2002]) was developed. b. Six Sigma™ process was tested in VA facilities. c. The Veterans Administration campaign, "Infection: Don't Pass It On" is a national campaign launched in the fall of 2004. The major focus of this ongoing campaign is hand hygiene, respiratory etiquette, and preparedness for infectious disease emergencies. d. Nationally directed MRSA Prevention Iniative incorporating a bundle approach consisting of hand hygiene, contact isolation, active surveillance culturing and cultural change/transformation.	a. Distributed to VA field facilities on 1/13/05, with implementation to be accomplished in VA facilities nationwide by March 1, 2005 b. Further development of Six Sigma™ defined strategies for implementation is ongoing. Published as "Using the six sigma process to implement the Centers for Disease Control and Prevention Guideline for Hand Hygiene in 4 intensive care units." J Gen Intern Med. 2006 Feb;21 Suppl 2:S35-42. with authors Eldridge NE, Woods SS, Bonello RS, Clutter K, Ellingson L, Harris MA, Livingston BK, Bagian JP, Danko LH, Dunn EJ, Parlier RL, Pederson C, Reichling KJ, Roselle GA, Wright SM. c. Initiated Fall 2004 and ongoing. During Association of Professionals in Infection Cntrol and Epidemiology National Conference June 2006 in Tampa, FL, presented as a general concurrent session d. Directive signed Jan 12, 2007 by Under Secretary for Health and all sites with acute care facilities have initiated at least one care unit (preferably an ICU) as of March 1, 2007
Action Item #44: Facilitate and Support the Activities of Infection Control Programs in Health Care Settings as a Component of Medical Care. Promote Infection Control Education at all Stages of Training and Practice for all Health Care Workers Who Have Contact with Patients.			
VA	Educational activities since January 2001:	Conference Speakers/Topics:	The VHA is currently in the forefront of infection control programs in the healthcare settings in the U.S. This includes national guidance, educational activities, and current financial support of the program nationwide. It is anticipated that such activities will continue, particularly because of the more recent emphasis on patient safety and infection control as part of an overall safety program to prevent excess infections in the healthcare setting.
VA	Department of Veterans Affairs Occupational Safety and Health Conference, Las Vegas, NV, August 8, 2001.	Employee Health: Vaccine and PPD Issues. Speaker: Gary A. Roselle, M.D. Emerging Infectious Diseases. Speaker: Stephen M. Kralovic, M.D.	
VA	Emerging Pathogens Satellite Broadcast, September 5, 2001	Part 1 – Tuberculosis. Part II – Implementation Thoughts and the Future. Presenter: Gary A. Roselle, M.D.	
VA	Infomercials taped and aired on VA Knowledge Network. Viewed by VHA employees.	2-3 minute "infomercials" covering issues relating to influenza, PPD's and bloodborne pathogens	
VA	Infection: Prevention and Containment Conference, such as handouts and responses to questions posed by attendees.	Conference Speakers for Infection: Prevention and Containment Conference included Gary A. Roselle, M.D., Stephen M. Kralovic, M.D., Robert Gaynes, M.D., Louis Rice, M.D., Robert Muder, M.D., Lynne Sehulster, PhD.	Infection: Prevention and Containment Conference was held May 4-6, 2004.
VA	Memorandum "CDC Hand Hygiene Recommendations and JCAHO Patient Safety Goal 7 for 2004" from VA Under Secretary for Health	The memorandum addressed the VA expectations concerning hand hygiene in VA medical facilities	VA Under Secretary for Health Memorandum pertaining to hand hygiene was issued to VA medial facilities nationwide 12/15/03.
VA	National Center for Health Promotion Monthly Topics	Some of the monthly topics address specific diseases and some address specific infectious diseases preventive measures	Information on the following, STDs/AIDS (April 2003), Immunizations (August 2003), and Tuberculosis (March 2004) were issued to VA facilities nationwide

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
VA	Planned Long Term Care Conference in September 2006	Issues of antibiotic resistance on agenda.	In process
VA	Infection Don't Pass It On campaign	The Veterans Administration campaign, "Infection: Don't Pass It On" is a national campaign launched in the fall of 2004. The major focus of this ongoing campaign is hand hygiene, respiratory etiquette, and preparedness for infectious disease emergencies.	Initiated Fall 2004 and ongoing. During Association of Professionals in Infection Cntrol and Epidemiology National Conference June 2006 in Tampa FL, presented as a general concurrent session
VA	National MRSA Prevention Initiative	Nationally directed MRSA Prevention Iniative incorporating a bundle approach consisting of hand hygiene, contact isolation, active surveillance culturing and cultural change/transformation.	Directive signed Jan 12, 2007 by Under Secretary for Health and all sites with acute care facilities have initiated at least one care unit (preferabbly an ICU) as of March 1, 2007
Action Item #45: Support Ongoing Public Health Education Campaigns on Food Safety, such as FDA and USDA's Fight BAC Program, Whose Aims Are To Educate Food Producers, Retailers, and Consumers About Food Safety Practices That Reduce Foodborne Infections (Including AR Infections).			
USDA	Innovative FS program for low literacy food handlers	Using enhanced and distance education programs	Ongoing. Funded by CSREES, NIFSI program. (univ of connecticut) See csrees website
USDA	Science-technology based fs education programs on safe food handling	Focused on consumers with use of collected data, databases	Ongoing. Funded by CSREES, NIFSI program. (univ of mo) See CSREES website
USDA	Good Agricultural Practices on line course for produce safety	Will also assess impact of training	Ongoing. Funded by CSREES, NIFSI program (Cornell) See CSREES website
USDA	Risk analysis based food defense certification program	For professional and academic programs	Ongoing. Funded by CSREES, NIFSI program (univ of md) See CSREES website
USDA	Food Safety training programs for ethnic vendors	Evaluate programs and implement changes, particulary for Asian and Mexican foods	Ongoing. Funded by CSREES, NIFSI program. (univ of fl) See csrees website
Action Item #46: Educate the Public About the Merits and Safety of Irradiation as One Tool To Reduce Bacterial Contamination of Food.			
CDC	Food Irradiation Education	CDC has produced a FAQ document on the promising benefits of food irradiation. Designed to education the public and discredit any myths about the process.	Available at: http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodirradiation.htm

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #47: Support Community-Based Programs That Promote and Facilitate Availability of Recommended Vaccinations for Adults and Children.			
VA	a. 2002-2003 Influenza/Pneumococcal Vaccine Toolkit, 2003-2004 Influenza/Pneumococcal Vaccine Toolkit, 2004 2005 Influenza/Pneumococcal Vaccine Toolkit, and 2005-2006 Influenza/Pneumococcal Vaccine Toolkit 2006-2007 Influenza/Pneumococcal Vaccine Toolkit b. Pneumococcal and Influenza Vaccination as Performance Measures	a. Influenza/Pneumococcal Vaccine Toolkits were developed to enhance local influenza/pneumococcal immunization programs throughout VA, and contain promotional items along with directive containing most recent influenza vaccine recommendations b. For many years VHA has included the delivery of both influenza vaccination and pneumococcal vaccination to at-risk populations (based on CDC recommendations) as a key performance measure for patient care. Performance measures constitute 50% of the annual evaluation for Executive Career Field (ECF) performance plans for VHA regional directors. Directive measures each year are signed by VHA Under Secretary for Heatlh regarding annual influenza immunizations for patients, and also encouraging healthcare worker participation.	a. Updated toolkits are sent to VA facilities nationwide in the fall of each year b. Ongoing
Action Item #48: Identify Vaccines Useful in Preventing Drug-Resistant Infections and Reducing Antimicrobial Drug Use and Evaluate Novel Methods For Improving Coverage with These Vaccines.			
CDC	ABCs special projects on pneumococcal resistance: prevention using vaccine and risk factors for fluoroquinolone resistance	This proposal seeks funding to complete two ongoing case-control studies being conducted in ABCs areas. The purpose of the first project is to evaluate the effectiveness of pneumococcal conjugate vaccine in children 3-59 months of age. The study began enrolling in FY 2001 and by the end of FY 2003 had enrolled 3031 children in eight ABCs areas; in FY 2004, study personnel will be enrolling children 24-59 months of age for one additional year to meet an objective of assessing effectiveness specifically for that age group. The purpose of the second project is to identify risk factors for invasive disease in adults caused by fluoroquinolone-resistant pneumococci. Cases are adults with invasive pneumococcal disease caused by a fluoroquinolone-resistant strain; 2 controls are selected for each case from subsequent cases caused by susceptible strains in adults. This study is ongoing in 9 ABCs areas and, based on our sample size estimates, will continue until Spring 2005.	The vaccine effectiveness study has been completed. A total of 91 cases with matching controls were enrolled into the study of risk factors for flouroquinolone-resistant infections. In multivariate analysis, nursing home residence and exposure to fluoroquinolones in the 3 months prior to disease were risk factors for infection with fluoroquinolone-resistant disease (Kyaw et al ICAAC 2005 abstract).
FDA	*H. influenzae* type B (HIB) vaccine	Monitoring of polysaccharide conjugated vaccines, including regular inspections of the production facilities, review and conduct of Lot Release studies, and review of amendments to the current Biologic License Application.	Ongoing. Several licensed vaccines. Continued vaccine supply essential to maintaining the near elimination of resistant *H. influenzae* disease in the U.S.
FDA	Pneumococcal vaccine	Monitoring and guidance provided to current manufacturer of a seven-valent conjugate vaccine. Ongoing. One licensed conjugate vaccine for the prevention of invasive disease and acute otitis media in infants and small children. Studies suggest decrease in AR among *S. pneumonia* isolates coincident with wide spread use of conjugate vaccine in infants. One licensed multivalent polysaccharide vaccine for the elderly.Facilitating clinical development of a more immunogenic vaccine for the elderly.	Ongoing. One licensed polysaccharide and one licensed conjugate vaccine for the prevention of invasive disease and acute otitis media. Studies suggest decrease in AR among *S. pneumonia* isolates coincident with wide spread use of conjugate vaccine in infants. One licensed multivalent polysaccharide vaccine for the elderly.
FDA	Pneumococcal conjugate vaccine	Identify mechanisms for establishing efficacy of additional pneumococcal conjugate vaccines with additional serotypes. Participated in multiple WHO Workshop held to discuss serologic correlates of protection. Also, provide regulatory review, conduct research and provide guidance to support licensure of additional pneumococcal vaccines (various products under IND).	Research regarding serologic assessment of response to vaccines ongoing. (Lee, CJ, et.al., Crit Rev Microbiol 2003:29(4)"333-349; Mikolajczyk, MG, et.al., Clin Diagn Lab Immunol 2004; 11(6):1158-1164)Also, provide regulatory review, conduct reseqrch and provide guidance to support licensure of additional pneumococcal vaccines (various products under IND).

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
FDA	Influenza vaccine	Regulatory and research support of annual trivalent inactivated and live intranasal influenza vaccine development, production and licensure, including additional manufacturers and novel technologies. Facilitating expanding indication to additional age groups and select immunocompromised population.	Ongoing regulatory review, research support and guidance for both seasona vaccines and pandemic influenza vaccines. Five 2006/07 seasonal influenza vaccines are approved, and in April 2007, the first H5N1 vaccine was approved.
FDA	Pertussis vaccine	Regulatory and research support for expanding the use of pertussis vaccine into additional age groups (ie: adolescent/adult use and possibly neonatal use).	Ongoing: Participated in First International Neonatal Vaccination Workshop in March 2004. Also, participating in collaborative study with FDA, CDC and Vanderbilt University to establish a serologic diagnostic cut-off point for pertussis infection in adolescent/adults (NHNES study). Two vaccines have been approved; one for use in 10-18 year olds and the other for use in 1-64 year olds.
FDA	Meningococcal Vaccine	Regulatory and research support for expanding the use of miningococcal vaccine from adults and adolescents into younger children.	Two vaccines available; one conjugate and one polysaccharide.
FDA	Shigella vaccine	Developing a prototype live-vectored oral vaccine containing protective antigen genes from Shigella. Goal is to construct a single vaccine for protection against all major serotypes of Shigella.	Ongoing.
FDA	Staphylococcal vaccine	Fast-Track designation granted for prevention of invasive *S. aureus* infections in patients receiving renal dialysis.	Ongoing, working with sponsor.
VA	Improve use of vaccines related to prudent use of antibiotics	Dept. of Veterans Administration, VHA Directive 2001-053. Influenza Vaccine – Recommendations for 2001-2002. Published andplaced on VA Intranet website 8/28/01. Infomercials were aired on VA Knowledge Network regarding influenza vaccine. Performance Measurement Program, 2001 and 2002 VHA Performance Measurement System Technical Manuals list Influenza Immunization and Pneumococcal Immununization as Preventive Care Quality Performance Measures, with specific recommendations for these immunizations for Nursing Home Care Units within VHA system.	The VHA is already in the forefront of immunization practices as is evidenced by the pneumococcal and influenza vaccine usage rates compared to the national averages. In addition, influenza vaccine use increases each year in the VHA as emphasis on this program continues. Therefore, this action item is already under way and will continue to be an area of emphasis area for the VA.
VA	Improve use of vaccines related to prudent use of antibiotics (con't)	Influenza Vaccine - Recommendations for 2002-2003, VHA Dir. 2002-044, Published 7/29/02. Influenza Vaccine Recommendations for 2003-2004, VHA Dir. 2003-058, published 10/7/03, Influenza Vaccine Recommenations for 2004-2005 VHA Directive 2004-052 published 9/29/04, Influenza Vaccine Recommendations for 2005-2006 VHA Directive 2005-047 published 10/21/05 and Influenza Vaccine Recommendations for 2006-07 VHA Dir 2006-058 published. Performance Measurement System Technical manual (See #24).	
Action Item #49: Evaluate the Nature and Magnitude of the Impact of Using Various Antimicrobial Drugs as Growth Promotants in Different Species, Using Current Animal Husbandry Practices. Use This Information To Assist in Risk-Benefit Assessments of Such Use.			
USDA	See action item #4 (Implementation of the Collaboration in Animal Health and Food Safety Epidemiology (CAHFSE)).	See action item #4 (Implementation of the Collaboration in Animal Health and Food Safety Epidemiology (CAHFSE)).	See action item #4 (Implementation of the Collaboration in Animal Health and Food Safety Epidemiology (CAHFSE)).
USDA	Comparison of antimicrobial resistance in Salmonella, *E. coli* , and Campylobacter isolated from swine farms using different antibiotic regimens, in collaboration with University of Georgia	The epidemiology of Salmonella, Campylobacter, Enterococcus and *E.coli* on swine farms using three different antimicrobial regimens was assessed. Results indicated that more resistance was identified in bacteria isolated from the farm using antimicrobials both sub-therapeutically and therapeutically. However, resistant bacteria were found to persist on the farm that has not used antimicrobials for the past 30 years.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #50: Conduct Additional Research To Further Define the Effects Of Using Various Veterinary Drugs on the Emergence of Resistant Bacteria That Infect or Colonize Food Animals of Different Species, Using Various Animal Husbandry Practices. Identify Risk Factors and Preventive Measures to Humans.			
USDA	See Action Item #49 (Comparison of antimicrobial resistance in Salmonella, *E. coli* , and Campylobacter isolated from swine farms using different antibiotic regimens, in collaboration with University of Georgia)	See Action Item #49(Comparison of antimicrobial resistance in Salmonella, *E. coli* , and Campylobacter isolated from swine farms using different antibiotic regimens, in collaboration with University of Georgia)	See Action Item #49(Comparison of antimicrobial resistance in Salmonella, *E. coli* , and Campylobacter isolated from swine farms using different antibiotic regimens, in collaboration with University of Georgia)
Action Item #51: Conduct Epidemiologic And Laboratory Studies To Assess the Risk of Development and Transfer of Resistance Related to The Use of Antimicrobial Drugs in Food and Non-Food Plants, and Identify Risk Factors and Potential Preventive Measures.			
CDC	Antibiotics used as pesticides in orchards	In the United States, apple and pear orchards are treated with streptomycin or oxytetracline sprays to control Erwinia amylovora bacteria (fireblight). We evaluated design protocols and methods to determine: 1) if there is a correlation between antibiotic treatment and resistance in bacteria from fruit samples; 2) if antibiotic-resistant bacteria on fruit are related to bacteria of human health concern; and 3) if they carry genetic elements for antibiotic resistance that could be transferred to other bacteria. Thirty composite fruit washes from hanging and dropped apples and pears treated with oxytetracycline, streptomycin, gentamicin, oxolinic acid or water were collected from 2 commercial and 2 research orchards. Bacterial abundance, and proportion resistant to treatment antibiotic, were determined for gram-negative (eosin-methylene blue medium), gram-positive (bile esculin agar) and environmental bacteria (R2A).	Bacteria resistant to treatment antibiotics were prevalent in each orchard, but extreme variability in bacterial numbers, and varying management practices in commercial and research orchards, confounded any association between treatment and proportion resistant. We are presently conducting focused analyses from the blossom stage to the fruit stage for bacteria with developed antibiotic resistance. Bacteria will be identified using morphological, biochemical and genetic testing, and evaluated for the presence of transferable genetic elements. The relation between presence of antibiotic resistant bacteria in stages of fruit production and transferable genetic elements will be explored.
USDA	To characterize Salmonella serotypes on their ability to cause disease in animals and to acquire and disseminate antimicrobial resistance genes.	Although there are over 2,400 different serotypes of Salmonella, they differ in their ability to cause disease in humans and animals, acquire resistant attributes, and colonize and persist with the host and environment. Salmonella serotypes were first characterized by their antimicrobial resistant pattern followed by molecular characterization in which mechanisms of resistance and genetic relatedness among other isolates of the same serotype were determined. These data demonstrated that Salmonella serotypes differ in their ability to persist within the host and environment and have determined that both integrons (mobile genetic elements) and plasmids, play a role in dissemination of resistance genes.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA. Poultry Processing and Meat Quality Research Unit, Poultry Microbiology Safety Research Unit, and the Eastern Regional Research Center in Philadelphia.
USDA	Study the prevalence of resistant in Mexico in *E. coli* populations	The prevalence of and risk factors for, fecal quinolone-resistant*E.coli* (QREC) in children from Yucatan, Mexico. WREC was higher in children with recent Salmonella infection than in children with diarrhea or healthy children. Recent hospitalization of a family member and carriage of Salmonella were identified as independent risk factors. These data indicate that novel strategies are required to measure the significance of these findings and that QREC should be closely monitored.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Feedlot Practices and their Impact on pre-and post- harvest antimicrobial susceptibility patterns of enteric bacteria.	This study will evaluate the effect of both subtherapeutic and therapeutic antimicrobial use in feedlot cattle on antimicrobial resistance and pathogen load in animals and on their carcasses.	Awarded 2004 (3 year grant). G. Lonergan, West Texas A&M. Funded by CSREES, NRI's 32.1 Epidemiologic Approaches to Food Safety.
Action Item #52: Develop Rapid Tests For Inspecting Fresh Commodities Like Fruit For Evidence Of Contamination With Bacteria That Are Resistant To Antibiotics.			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
FDA	Rapid methods development	Validated culture methods for foodborne pathogens in animal feeds.	Completed development and instillation of cultural methods to be used in screening feeds and feed commodities for the presence of the Bacillus cereus group. This is part of our efforts to investigate issues of importance to animal feed security and support development of the Animal Feed Safety System Continue to collaborate with USDA-Agricultural Marketing Service to determine DNA fingerprint patterns and antimicrobial susceptibilities among Salmonella and *E. coli* isolates recovered from produce obtained from the microbiological data program plan.
FDA	Rapid methods development	Development of rapid diagnostic methods to detect biological contamination of foods. Have developed and evaluated several microarray-based assays for detection of resistence genes for Streptococcus and Staphylococcus species.	Ongoing.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #53: Evaluate the Effect of Current Food Processing and Distribution Methods on the Emergence and Spread of Drug-Resistant Organisms.			
FDA	NARMS retail food	Monitor prevalence of antimicrobial resistant zoonotic pathogens and commensal organisms among foods of animal origin.	NARMS retail was initiated in 2002, as of 2007, 9 FoodNet sites are participating. The 2004 NARMS retail meat annual report was recenlty published and can be found at http://www.fda.gov/cvm/NARMSReport2004.htm. FDA is currently involved in publishing the 2005 annual report. Also, partnered with scientists in the FDA Office of Regulatory Affairs in characterizing antimicrobial resistant Salmonella isolated from imported foods.
Action Item #54: Identify and Evaluate New Food Pasteurization Strategies.			
Action Item #55: Assess the Risk of AR Emergence and Spread due to Environmental Contamination by Antimicrobial Drugs or by Resistant Bacteria in Animal and Human Waste. Collect Information on Whether Environmental Contamination by Antimicrobial Drugs Can Lead to the Development of Resistance in Bacteria That Live in Soil or Water.			
FDA	Animal production studies	Determine dynamics of resistance development in naïve animal populations exposed to antimicrobial agents.	Completed animal studies focusing on the development and persistence of bacteria resistance after exposure to specific antimicrobials. Two studies have been completed in poultry: the first focused on fluoroquinolone resistance development in *Campylobacter* after exposure to veterinary approved fluoroquinolones, while the second concentrated on the emergence and carriage of streptogramin resistance in enterococci exposed to the veterinary streptogramin, virginamycin. Also, partnered with scientists at The Ohio State University to determine the influence of conventional and organic poultry production practices on antimicrobial resistance of Campylobacter on poultry farms and scientists at the University of Maryland and Henry Ford Hospital in Detroit, MI in characterizing streptogramins resistance plasmids in Enterococcus faecium recovered from human and animal sources.
USDA	See Action Item #19. Enhance overall understanding of pathogens that pose a food-safety risk particularly from the environment.	See Action Item #19. Enhance overall understanding of pathogens that pose a food-safety risk particularly from the environment.	See Action Item #19. Enhance overall understanding of pathogens that pose a food-safety risk particularly from the environment. Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
Action Item #56: Assess the Impact of Antimicrobial Use in Companion Animals (Pets) on Colonization and Infection with Drug-Resistant Organisms in The Animals and Their Humans Household Contacts.			
VA	Animals in Health Care Facilties	Information Letter in preparation for signature from the Under Secretary for Health which deals with numerous aspects related to animals in healthcare facilities, including the potential for transmission of antibiotic resistance between humans and animals.	In preparation.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #57: Work with Veterinary and Agricultural Communities To Help Educate Users of Veterinary and Agriculture Antimicrobials About AR Issues, and Promote the Implementation and Evaluation of Guidelines That Address These Issues.			
CDC	Get Smart: Know When Antibiotics Work on the Farm	Work with veterinary and agricultural communities to help educate users of veterinary and agricultural antimicrobials about AR issues and to promote th implementation and evaluation of guidelines that address issues of appropriate antimicrobial use in agricutural and veterinary settings; performance and interpretation of antimicrobial susceptibility tests performed on specimens from different species of animals; and point-of-care tests for infections, including AR infections.	Ongoing: There are 10 funded state-based campaigns currently working on state-based projects and interventions addressing appropriate antimicrobial use. Information gained from the state-based campaigns will be used to develop educational materials, an antibiogram, and a mastitis protocol which then will be distributed to agricultural and veterinary settings.
CDC	Fund and develop state-based educational programs to promotoe appropriate antimicrobial drug use	Several states are developing state based education programs in collaboration with agricultural industry groups to educate veterinarians and animal producers on appropraite antimicrobial drug use. Funding for these projects is provided by the Get Smart: Know When Antibiotics Work on the Farm program.	Ongoing. Continuing development of educational materials with partners at Tacoma-Pierce County Health Department in Tacoma Washington. A KAP survey of dairy producers was completed and educational materials were distributed to all of the state's dairy producers. The project is now evaluating six dairy farms for antibiotic use best practices. All other state programs were discontinued due to lack of funds.
CDC	Development of model veterinary school curriculum to promote appropriate antimicrobial drug use	A curriculum is being developed in collaboration with partners that will be offered to veterinary schools. Completed curriculum will consist of Background Module and several Species Specific Modules (dairy cattle, small animal, poultry, etc.).	Ongoing. Continuing development of Web-based course material with partners at Michigan State University, College of Veterinary Medicine and the University of Minnesota, College of Veterinary Medicine. A background module is complete and is posted to the web. Subject matter experts have reviewed the several modules of the curriculum including an exotics module, a dairy modules, and an international module. A beef specific module has been written and a swine module and companion animal module are under development. Other experts are being sought out to write additional species specific modules. It is expected to have the background module and several species specific modules completed and in use by Fall 2006.
FDA	Education/outreach materials	Develop outreach material on judicious use targeted to veterinarians.	Ongoing activity.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
** TOP PRIORITY **			
Action Item #58: In Consultation with Stakeholders, Refine and Implement the Proposed FDA Framework for Approving New Antimicrobial Drugs for Use in Food-Animal Production and, When Appropriate, for Re-Evaluating Currently Approved Veterinary Antimicrobial Drugs.			
FDA	Drug categorization	Develop an approach for how to evaluate drugs as to their importance in human medicine for use in animal drug premarket application requirements for use in CVM's guidance for industry on the strategy for ensuring the safety of new animal drugs with regard to their microbiological effects on bacteria of human health concern.	Ongoing. An approach for ranking antimicrobial drugs as to their importance for human medicine was developed by CDER and incorporated into CVM's draft guidance published in November 2002. Comments on the approach were obtained from the CDER Anti-infective Advisory Committee in January 2003 and incorporated into the final guidance (G#152) that published in October 2003.
FDA	Fluoroquinolones	Withdraw approval of fluoroquinolones for use in poultry	Sarafloxacin voluntarily withdrawn April 30, 2001; hearing requested for Bayer's enrofloxacin. Legal proceedings complete. On July 28, 2005, Food and Drug Administration (FDA) Commissioner Lester Crawford announced the Agency's final decision to withdraw the approval of the new animal drug application (NADA) for the use of the antimicrobial drug enrofloxacin for the purpose of treating bacterial infections in poultry. The Final Rule withdrawing approval of the antimicrobial drug enrofloxacin for the purpose of treating bacterial infections in poultry was effective on September 12, 2005.
FDA	Risk assessment	Risk assessment: Conduct an analysis of the relationship between emergence of streptogramin-resistant *Enterococcus faecium* (Synercid) in humans and use of streptogramins (virginiamycin) in food-producing animals.	Draft risk assessment published November 23, 2004; public comment period through February 25, 2005. The Center for Veterinary Medicine (CVM) conducted a thorough review and analysis of all the comments submitted to the Docket. Considerable attention was given to the potential impacts of suggested changes on risk estimates, particularly in light of new information in the scientific literature. However, there was insufficient basis to warrant revision of the original risk assessment. CVM will continue to monitor the scientific literature, the results of surveillance studies, the usage patterns of Synercid (and other future streptogramin drugs) in hospital and health care settings, and other relevant data that may affect the findings of the risk assessment and will revisit the risk assessment at a time dictated by the availability of new data and scientific developments in streptogramin resistance.
FDA	Pathogen load	Develop guidance relating to antimicrobial drug effects on pathogen load and incorporate into CVM's guidance for industry on the strategy for ensuring the safety of new animal drugs with regard to their microbiological effects on bacteria of human health concern.	Literature review published on CVM website May 2001. Veterinary Medicine Advisory Committee meeting held January 22-24, 2002. Based on the lack of scientific consensus on the issue, CVM has decided not to pursue guidance regarding pathogen load effects at this time.
FDA	Microbiological safety requirements	Develop pre-approval requirements for microbiologic safety regarding the use of antimicrobial agents in food-producing animals. Incorporate into CVM's guidance for industry on the strategy for ensuring the safety of new animal drugs with regard to their microbiologic effects on bacteria of human health concern.	Draft guidance for industry was published in September 2002. Public meeting was held in October 2002 to present guidance document and obtain public comment. Comment period from the guidance closed in November 2002 and an analysis of comments received has been completed. Final guidance was published in October 2003. Several antimicrobial drugs have been approved using the guidance.
FDA	Antimicrobial use in food-producing animals	Develop rulemaking relating to annual reports of use and quantity of antimicrobial drugs marketed for food animals	Participated in WHO expert consultation on monitoring drug use in September 2001. Developed draft proposed rule and guidance. FDA is holding proposed rule and guidance while assessing economic impact of the proposed regulation. No change.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
FDA	Framework document	Refine the Framework Document and incorporate the concepts into guidance for industry on a strategy for assuring the safety of new animal drugs with regard to their microbiological effects on bacteria of human health concern.	Comments from public meetings and submitted to the Framework Document have been incorporated into guidance; small, outreach meetings held with stakeholder groups throughout 2001 for additional input. Key concepts from the Framework Document have been incorporated into the draft guidance for industry published in November 2002. Final guidance was published in October 2003. http://www.fda.gov/cvm/VMAC/antimi18.html
Action Item #59: Strongly Encourage Involvement of Veterinarians in Decisions Regarding the Use of Systemic Antimicrobial Drugs in Animals, Regardless of the Distribution System Through Which the Drug Is Obtained (e.g., Regardless of Whether a Prescription Is Required To Obtain the Drug).			
FDA	Educational materials	Develop outreach materials on judicious use targeted to food animal producers.	CVM has developed a series of booklets that explain antimicrobial prudent use principles in depth for beef, dairy, swine, poultry, and more recently aquatic veterinarians. CVM has also produced a nine-minute animation explaining how antimicrobial resistance both emerges and proliferates among bacteria and can be found on the CVM web site http://www.fda.gov/cvm/antiresistvideo.htm.
FDA	AR use by veterinarians	Develop a Web-based decision support system for use by veterinarians to select and use antimicrobial agents appropriately.	Provided funding for development of Veterinary Antimicrobial Decision Support System; five year contract awarded late 2001. The Veterinary Antimicrobial Decision System continues to be revised and improved. Feedback from users on the data used as well as modeling and interpretation methods are currently being solicited.
Action Item #60: Evaluate the Potential Impact of Making All Systemic Veterinary Antimicrobial Drugs Available by Prescription Only.			
Action Item #61: Convene an Expert Group To Consider How To Incorporate AR Issues into Regulations Governing the Registration and Use of Antimicrobials and Antibiotic Pesticides. Invite External Experts, Stakeholders, and the Public To Provide Input.			
Action Item #62: Establish an Ongoing Mechanism To Obtain Periodic Input from External Experts on AR Issues. This Process Will Include Ensuring Input from Stakeholders and Partners (e.g., State and Local Health Agencies, the Private Sector, and the Public) in Developing and Reviewing Federal Efforts To Address Antimicrobial Resistance.			
ARHQ, CDC, CMS, DoD, HRSA, USAID, VA, EPA, FDA, NIH, USDA	Antibiotic resistance task force	Annual Progress Report and Public Meeting.	In 2004, progress report issued consisting of inventory of projects that address Action Plan items. Fourth annual public meeting June 29, 2005, Bethesda, MD. Convened consultants meeting to discuss issues relating to writing of Part II of the Action Plan (Global Issues), September 26, 2002, San Diego, CA. Sent Task Force Representative to World Health Organization to help WHO implement Global strategy on AR.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
**** TOP PRIORITY ****			
Action Item #63: Support Demonstration Projects To Evaluate Comprehensive Strategies That Use Multiple Interventions To Promote Appropriate Drug Use and Reduce Infection Rates.			
CDC	PRevention of Infection caused by Methicillin or Oxacillin resistant Staphylococcus aureus (PRIMO): Recurrent CA-MRSA prevention trial	Primary Objectives are as follows:1. Test the efficacy and safety of a body decolonization regimen at preventing recurrent CA-MRSA infections among persons with recurrent CA-MRSA infection, 2.Test the efficacy of an environmental decolonization regimen at preventing recurrent CA-MRSA infections in persons with recurrent CA-MRSA infections	Protocol developed, IRB approval obtained and enrollment initiated in June 2007.
CDC	Comprehensive demonstration project: building regional coalitions to prevent methicillin-resistant *Staphylococcus aureus* (MRSA) 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 success of the initial interventions in two area hospitals has attracted interest and participation from other healthcare facilities in the region, and the organization of the regional prevention initiative continues to mature. Milestones include: • 19 regional hospitals have committed to the MRSA prevention initiative, and the group has elected to use CDC's National Healthcare Safety Network (NHSN) for regional data collection. Pilot data submission has begun in two pilot hospitals, with plans to pilot in an additional 7 hospitals prior to expanding to all participants in the region. • Regional third party payor (has initiated an pilot, voluntary, pay-for-performance initiative among hospitals in the region regarding MRSA infection prevention. • Investigators in Southwestern Pennsylvania collaborated with Plexus Institute received a $290,000 grant from Robert Wood Johnson Foundation tp spread the initiative to hospitals in eastern Pennsylvania, Marlyand, and Montana.
VA	Six SigmaTM process to promote hand hygiene in VA medical facilities.	National VA effort to use the Six SigmaTM process in the hand hygiene promotion effort. Pilot project at 3 VA medical facilities, with products from the testing to be distributed nationwide to all VA medical facilities.	Six SigmaTM process regarding hand hygiene being tested at 3 VA medical facilities. Publshied as "Using the six sigma process to implement the Centers for Disease Control and Prevention Guideline for Hand Hygiene in 4 intensive care units."J Gen Intern Med. 2006 Feb;21 Suppl 2:S35-42. with authors Eldridge NE, Woods SS, Bonello RS, Clutter K, Ellingson L, Harris MA, Livingston BK, Bagian JP, Danko LH, Dunn EJ, Parlier RL, Pederson C, Reichling KJ, Roselle GA, Wright SM.
VA	AHRQ 1 UC1 HS014237 Toward a Safety Culture: Reducing Nosocomial Infections C.	VA personnel are leading a regional research study sponsored by AHRQ designed to look at rapid-cycle implementation strategies of evidence-based practices that are known to reduce health care associated infections	Primary study accrual has completed and review and reporting of results is ongoing. This regional cooperative project received the 2005 Joint Commission on Accreditationof Healthcare Organizations (JCAHO) Ernest Amory Codman award and demonstrated findings of: i) reduced central line infections by 50 percent. ii) increased adherence to evidence-based practices to 95 percent from 30 percent. iii) created a new model for facilitating improvement as a community, with an increased chance of success, sharing of successful strategies, reducing rework across the sites, and speeding the implementation process.
VA	Toyota Production System (TPS) process to reduce infection	Through a demonstration project sponsored by CDC, VA facilities in Pittsburgh along with other health care institutions in the region participated in evaluation of a methodology (Toyota Production System process) for implementing change in infection control practices	Has demonstrated decrease with sustained success in resistant Staphylococcus aureus within facility Abstract presented at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2006, Chicago, IL authors R Muder, E McCray, C Cunningham, P Perreiah, C Squier, R Sinkowith-Cochran, J Jernigan. Ongoing

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
VA	Positive Deviance	Use of Postiive Deviance model to assist with national MRSA Prevention Initiative	Abstracts demonstrating use of positive deviance for cultural change at the Pittsburgh VA as part of its' successful MRSA reduction efforts presented at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2007, Baltimore, MD authors R. muder, C Cunningham, S. squier, E McCray, R Jain, R sinkowitz-Cocharn, J Lloyd, J Jernigan on the first abstract and J Jacob, R Muder, C Cunighham, E McCray, C Squier, C Mehta, R Jain, R Sinkowitz-Cochran, J Llyod and J Jernigan on the second abstract Ongoing
VA	Inpatient Evaluation Center (IPEC)	The IPEC is a national program to improve outcomes (risk adjusted mortality and length of stay) in VA ICUs and eventually in inpatient care through feedback of outcomes and implementation of evidenced-based practices. Currently two of the initiatives deal with issues related to infection prevention--catheter-related bloodstream infections and ventilator-associated pneumonias--both of which may involve resistant organisms These data are reported back immediately to the local facilities who can track their rates over time and compliance with performance, as well as see the national mid-range statistical analysis results.	IPEC program initiated nationwide during FY 2006 with initial data demonstrating a decrease in ventilatro-associated pneumonias and central catheter related bloodstream infections nationwide within the past year.
Action Item #64: Utilize Federal Health Care Systems (e.g., DoD, VA) as Models for AR Surveillance and Prevention and Control Activities Involving Appropriate Drug Use, Optimized Diagnostic Testing, Infection Control, and Vaccination Practice.			
VA	Six SigmaTM process to promote hand hygiene in VA medical facilities.	National VA effort to use the Six SigmaTM process in the hand hygiene promotion effort. Pilot project at 3 VA medical facilities, with products from the testing to be distributed nationwide to all VA medical facilities.	National VA effort to use the Six SigmaTM process in the hand hygiene promotion effort. Pilot project at 3 VA medical facilities, with products from the testing to be distributed nationwide to all VA medical facilities.
VA	AHRQ 1 UC1 HS014237 Toward a Safety Culture: Reducing Nosocomial Infections	VA personnel are leading a regional research study sponsored by AHRQ designed to look at rapid-cycle implementation strategies of evidence-based practices that are known to reduce health care associated infections	Primary study accrual has completed and review and reporting of results is ongoing. This regional cooperative project received the 2005 Joint Commission on Accreditationof Healthcare Organizations (JCAHO) Ernest Amory Codman award and demonstrated findings of: i) reduced central line infections by 50 percent. ii) increased adherence to evidence-based practices to 95 percent from 30 percent. iii) created a new model for facilitating improvement as a community, with an increased chance of success, sharing of successful strategies, reducing rework across the sites, and speeding the implementation process.
VA	Toyota Production System (TPS) process to reduce infection	VA facilities in Pittsburgh along with other health care institutions in the region participated in evaluation of a methodology for implementing change in infection control practices	Has demonstrated decrease with sustained success in resistant Staphylococcus aureus within facility Abstract presented at the Society for Healthcare Epidemiology of America Annual Scientific Conference April 2006, Chicago, IL authors R Muder, E McCray, C Cunningham, P Perreiah, C Squier, R Sinkowith-Cochran, J Jernigan. Ongoing
VA	Surgical Site Infection Antibiotic Prophylaxis plan	VHA has introduced surgical site antibiotic prophylaxis as a performance measure for VHA systems nationwide. These performance measures constitute 50% of the annual evaluation for Executive Career Field (ECF) performance plans for VHA regional directors.	For Federal Fiscal Year 2005, VHA has introduced surgical site antibiotic prophylaxis as a performance measure for VHA systems nationwide, appropriate antibiotic choice as a performance measure is currently being pursued.
VA	Influenza and Pneumococcal Vaccinations as Performance Measures	VHA has included the delivery of both influenza vaccination and pneumococcal vaccination to at-risk populations as a key performance measure for patient care.	Ongoing FY For Federal Fiscal Year 2006, VHA has introduced timing of antibiotics for community-acquired pneumonia for inpatients and is pursing measures for appropriate antibiotic choices.
VA	Community-acquired pneumonia treatment	VHA has introduced through it's Office of Quality and Performance quality measures for timing of antibiotics and appropriate antibiotic choices with respect to treating community acquired pneumonia for inpatients.	VHA has introduced through it's Office of Quality and Performance quality measures for timing of antibiotics and appropriate antibiotic choices with respect to treating community acquired pneumonia for inpatients.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
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VA	Inpatient Evaluation Center (IPEC)	The IPEC is a national program to improve outcomes (risk adjusted mortality and length of stay) in VA ICUs and eventually in inpatient care through feedback of outcomes and implementation of evidenced-based practices. Currently two of the initiatives deal with issues related to infection prevention--catheter-related bloodstream infections and ventilator-associated pneumonias--both of which may involve resistant organisms These data are reported back immediately to the local facilities who can track their rates over time and compliance with performance, as well as see the national mid-range statistical analysis results.	IPEC program initiated nationwide during FY 2006 with initial data demonstrating a decrease in ventilatro-associated pneumonias and central catheter related bloodstream infections nationwide within the past year.
VA	National MRSA Prevention Initiative	Nationally directed MRSA Prevention Iniative incorporating a bundle approach consisting of hand hygiene, contact isolation, active surveillance culturing and cultural change/transformation.	Directive signed Jan 12, 2007 by Under Secretary for Health and all sites with acute care facilities have initiated at least one care unit (preferably an ICU) as of March 1, 2007
Action Item #65: For All Healthcare Systems for Which Federal Funds Are Provided, Identify and Promote Strategies To Establish AR Prevention and Control Activities as Part of Quality Monitoring Programs.			
VA	Quality assurance programs	The Office of Quality and Performance's Performance Measurement Program, which supports the VHA Strategic Plan, serves as a vehicle for effecting change in a balanced fashion. The Performance Plan operationalizes the premise that better quality, access, and satisfaction are often more efficient. Example, improved rates of inexpensive pneumococcal vaccinations may result in decreased antibiotic use. Immunization rates are assessed through a contract chart review system and are part of managers' perf. standards, and, therefore, used as part of the VHA quality-monitoring program. Excellent immunization rates in VHA have resulted from this program.	Ongoing. The VA Under Secretary for Health's hand hygiene memorandum was issued to VA medical facilities nationwide on 12/15/03. The study "Toward a Safety Culture" is in process.
VA	Quality assurance programs (con't)	Additionally the Office of Quality and Performance has included quality measures relating to surgical antibiotic prophylaxis and antibiotic treatment for patients admitted with community-acquired pneumonia. JCAHO Safety Goal #7 - Hand Hygiene to reduce healthcare-associated infections were addressed in a memorandum by VA Under Secretary for Health. AHRQ StudyToward a Safety Culture: Reducing Nosocomial Infections.	
VA	National MRSA Prevention Initiative	For the National MRSA Prevention Initiative (noted above in #64), the Office of Quality and Performance has sponsored support of 17 beta-testing sites for this initiative to determine if quality measures related any or all components of the bundle approach may be amenable to further analysis by quality monitors.	In progress with evaluation beginning with initiation of beta-test sites in Summer 2006
Action Item #66: Encourage Nationally Recognized Accrediting Agencies such as The National Committee for Quality Assurance (NCQA), and the Joint Commission on Accreditation Standards That Promote Efforts To Prevent and Control AR, Including Appropriate Use, Infection Control, Vaccine Use, and Diagnostic Testing. These Standards May Draw on the Findings of Existing Data and Demonstration Programs and AHRQ Evidence-Based Practice Centers.			
Focus Area III: Research			
Action Item #67: Additional Research, Including High Risk and High Payoff Research in Nontraditional Fields, Is Needed.			

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH, DoD	Biotechnology Engagement Program (BTEP)	The BTEP Program is an attempt by the U.S. government to engage former Soviet Union scientists that conducted biowarfare research to refocus on issues of mutual benefit. DMID program staff oversee a U.S. – Russian Collaborative TB research project initiated in 2001 with Professor A. Llyichev of Vector in Novosibirsk entitled, "Drug resistant tuberculosis in Western Siberia." Staff oversee, "Molecular epidemiology and antibiotic resistance of bacterial infections in Georgia" in collaboration with Lela Bakanidze of the National Center for Disease Control of Georgia.	Ongoing.
NIH, DoD	IDCRP collaborative research in MDROs		
CDC	AR mechanisms of *S. pneumoniae (*Alaska)	Use of PCR methodologies to rapidly screen *S. pneumoniae* isolates for genetic determinants of resistance; monitoring the emergence, spread, persistence, and decline of multidrug-resistance organisms by molecular-based typing capabilities to include multilocus sequence typing (MLST).	Molecular epidemiolgy of invasive macrolide resistant pnemococcal isolates from Alaska: 1986-2006. The aim was to determine the prevalence of macrolide resistance among invasive SP isolates recovered and to characterize the isolates on a molecular level. Overall macrolide resistance was 8.3%, increasing from a low of 0.8% in 1988 to 21.4% in 2000 with a decline to 5.2% in 2006. Prior to introduction of PCV7, 60.3% of erythromycin resistant isolates were nonsusceptible to penicillin. Post-PCV7, 83.7% of erythromycin resistant isolates were nonsusceptible to penicillin. Sixty percent of erythromycin resistant isolates were multidrug resistant (3 or more antibiotics) pre-PCV7 while 70% were multidrug resistant post-PCV7. Predominant serotypes of erythromycin resistant strains pre-PCV7 were 6B (24.1%), 9V (13.8%), and 14 (37.9%).
FDA	Multi-drug resistant TB	Identified genetic mechanisms causing resistance in multi-drug resistant tuberculosis.	Ongoing.
FDA	Whole Genome sequencing of antibiotic resistant and susceptible *Salmonella* serovars.	Sequence genomes of 18 isolates of prevlent serovars of *Salmonella enterica,* including pairs of multi-drug resistant and susceptible strains, to help determine the basis for emergence of multiple antibiotic resistances in outbreak strains. The collaboration between FDA and The Institute for Genome Rsearch is supported by NIAID.	Ongoing.
FDA	DNA and phenotypic microarray analyses of E.coli, Shigella, and Salmonella outbreak strains.	Gene analysis by DNA microarray and phenotypic analysis by Biolog PM profiling are being used to characterize novel antibiotic resistances in foodborne outbreak strains of enteric pathogens.	Ongoing
FDA	DNA microarray profiling of antibiotic resistance genes.	Develop DNA microarray techniques and DNA chips for characterizing antibiotic resistance genes for multiple bacterial pathogens.	Ongoing. In conjunction with scientists at the University of Maryland and Ohio State University, developed over 100 PCR primers to target genes associated with resistance in Salmonella and *E. coli* to 6 categories of antimicrobial agents, including B-lactams, aminoglycosides, phenicols, tetracyclines, and sulfonamides.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
FDA	Studies on the Mechanism of fluoroquinolone (FQ) resistance and molecular screening for resistance determinants in Campylobacter, *E. coli* , and Salmonella	Isolate and characterize FQ resistant Campylobacter, *E. coli* and Salmonella from chicken and turkey farms.	21 FQ resistant campylobacter were isolated from chicken liver samples and characterized by PCR-RFLP and Pulsed field gel electrophoresis (PFGE). Seventy-eight campylobacters were isolated from turkey litter samples and characterized for the presence of galE gene, PCR-RFLP and PFGE. Quinolone resistance determining regions (QRDR) from campylobacters and *E. coli* were PCR amplified and sequenced for the detection of silent mismatched mutations. The FQ resistant *E. coil* strains isolated from chicken and turkey litter were typed by ribotyping. Completed in vivo studies examining the development of fluoroquinolone resistance among Campylobacter from chickens administered approved fluoroquinolones. Continue to characterize at the molecular level, resistant Salmonella, Campylobacter and *E. coli* as part of the NARMS retail program.
FDA	Fate and degradation of antimicrobials, oxytetracycline (OTC) and sulfadimethoxine-ormetoprim (Romet 30) from aquaculture environmental samples	To isolate and characterize OTC and Romet 30 resistant Aeromonas spp., Pseudomonas, Citrobacter and *E. coli.* From aquaculture and catfish tissues.	30 OTC resistant *Aeromonas spp* . have been isolated. These isolates have been characterized by PFGE. These investigations are still in progress.
FDA	Develop a microarray chip for the detection of multiple antibiotic resistance markers	Oligonucleotide probes to detect resistance markers for 17 different antibiotics would be embedded in microarray slides. These would be hybridized with in vitro-labeled cDNA of the resistant bacteria isolated from farm animals or clinical samples. The microchip would help FDA efficiently monitor and track resistant markers and make regulatory decisions. It would also aid physicians for choosing appropriate antibacterial therapy.	Ongoing.
FDA	Elucidation of the mechanism of resistance development in anaerobic bacteria from human intestinal tract	Evaluation of the effect of fluoroquinolones on the resistance development in the bacteria from the human intestinal tract and analysis of the fluoroquinolone resistance mechanism in anaerobic bacteria from the human intestinal tract.	Ongoing.
FDA	Biodegradation of fluoroquinolone antibiotics	The fungus Pestalotiopsis guepini metabolized the fluoroquinolone antimicrobial agent norfloxacin to 7 amino-1-ethyl-6-fluoro-4-oxo- 1,4 dihydroquinolone-3-carboxylic acid and three other metabolites during growth on rice hulls used as poultry litter, suggesting that fungi that grow on poultry litter may be able to metabolize residues of fluoroquinolone drugs. The intestinal bacterium Enterococcus durans degraded 1-phenylpiperazine to N-acetyl-1-phenylpiperazine, N-formylaminoethylaniline and 2-phenylaminoethanol, suggesting a potential role in the breakdown of other compounds, such as fluoroquinolone drugs, that contain a piperazinyl group.	Ongoing.
FDA	Blood borne pathogens	Develop rapid assays to identify blood borne pathogens using nucleic acid based tests (NAT) and a TaqMan assay to detect bacterial contamination in whole blood and platelets. The sequences used in these primer sets are conserved in 19 bacterial species.	Ongoing research to develop a DNA microarray based pathogen chip that could detect all pathogenic bacteria that contaminate blood and blood products.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	NIH CRISP Database	CRISP <http://crisp.cit.nih.gov/> (Computer Retrieval of Information on Scientific Projects) is a searchable database of federally funded biomedical research projects conducted at universities, hospitals, and other research institutions. The database, maintained by the Office of Extramural Research at the National Institutes of Health (NIH), includes projects funded by NIH, Substance Abuse and Mental Health Services Administration (SAMHSA), Health Resources and Services Administration (HRSA), Food and Drug Administration (FDA), Centers for Disease Control and Prevention (CDC), Agency for Healthcare Research and Quality (AHRQ), and Office of the Assistant Secretary of Health (OASH). Users, including the public, can use the CRISP interface to search for scientific concepts, emerging trends and techniques, or identify specific projects and/or investigators.	Ongoing.
NIH	Innovative approaches for combating antimicrobial resistance	This initiative (RFA: AI02-009) was designed to stimulate novel and innovative research, including high risk and high payoff studies in nontraditional fields, to acquire a better understanding of the factors affecting the development of resistant pathogens and spread of resistance genes, in order to direct actions to diagnose, control, and treat AR.	Ongoing. 18 grants funded in early 2003. Projects include: "Using Genomics to Identify Antibiotic Sensitivity Genes," "Predicting Resistance: Validating Mathematical Models," "and "Ciprofloxacin resistance and compensatory mutations," among others.
NIH	Investigator-initiated small research grant award program announcement (R03)	The R03 award supports small research projects that can be carried out in a short period of time, with limited resources. This solicitation extends its use to unsolicited applications in addition to its use in individual Requests for Applications (RFA) and Program Announcements (PA). This is an important mechanism for attracting new investigators to a field of study and providing sufficient support to allow development of preliminary data that will enable successful long-term funding.	Program Announcement PA-06-180 was released on March 2, 2006; expiration date: May 2, 2009. Awards to be made in FY2007.
NIH	NIH Exploratory/Developmental Research Grant Award (R21)	This announcement redefines the National Institutes of Health (NIH) Exploratory/Developmental Research Grant Award (R21) mechanism, and extends its use as an investigator-initiated mechanism to a variety of Institutes and Centers (ICs) listed in the announcements.	Ongoing. Examples of recent R21 NIAID awards include: "Small molecule inhibitors of pantothenate synthesis against M. tuberculosis," "Lead identification of 1,4-benzoxazines as anti-tuberculosis agents," and "Structure of Beta-lactam resistance regulators."
NIH	Investigator initiated grants mechanisms (R01)	NIH funds a diverse portfolio of grants to study AR in major viral, bacterial, fungal, and parasitic pathogens. Projects include basic research into the disease-causing mechanisms of pathogens, host-pathogen interactions, and the molecular mechanisms responsible for drug resistance, as well as applied research to develop and evaluate new or improved products for disease diagnosis, intervention, and prevention.	Ongoing. Examples of recent R01 awards include: "A new target for malaria drug development," "Metalloid transporters and drug resistance in Leishmania," "Screen development for antimicrobial prodrugs," "Antiinfection agents that Target Protein Synthesis" "Gonococci: genetics of resistance to PMN proteins" and "Combination Chemotherapy for Pandemic Influenza"
NIH	NIH Academic Research Enhancement Award (AREA) Grants - (R15)	AREA grants support individual research projects in the biomedical and behavioral sciences conducted by faculty, and involving their undergraduate students, who are located in health professional schools and other academic components that have not been major recipients of NIH research grant funds.	Ongoing. Examples of recent R15 awards include: "Chitinases in parasitic helminths," "Design of Novel Linear Cationic Antimicrobial Peptides," and "Synthesis of Novel Water-Soluble Glycodendrimers as Anti-HIV Agents."
NIH	Small Business Innovation Research and Technology Transfer Research Program (SBIR/STTR)	The SBIR/STTR program is an omnibus solicitation established under federal law that seeks to use small business to stimulate technological innovation, increase the participation of small business in federal R&D, and to increase private sector commercialization of technology development through Federal R&D. The annual set-aside for agencies with extramural research budgets over $100M is 2.5%.	Ongoing. Currently support a partnership between Cepheid Inc and the New Jersey Medical School under a Phase II STTR for advanced development and pre-clinical testing of a diagnostic system that simultaneously detects the presence of Mycobacterium tuberculosis (TB) and diagnose rifampin resistance directly from clinical sputum samples.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Cooperative Research for the Development of Vaccines, Adjuvants, Therapeutics, Immunotherapeutics & Diagnostics for Biodefense	To support discovery/design and development of vaccines, therapeutics, adjuvants, and diagnostics for biodefense. This program will help translate research from the target identification stage through target validation to early product development.	Recent awards include: "Integrated Antimicrobial Drug Discovery Scheme for Multidrug Resistant Bacteria."
NIH	Food and Waterborne Diseases Integrated Research Network (FWDIRN)	NIAID's FWDIRN network includes multidisciplinary research on all food and waterborne pathogens (bacteria, viruses, and protozoa), as well as toxins, to facilitate the development and evaluation of products to rapidly identify, prevent, and treat food and waterborne diseases that threaten public health. The network includes Immunology (IRU), Microbiology (MRU), Zoonoses (ZRU) and Clinical (CRU) Research Units. The Network is supported by a Coordinating and Biostatistics Center. One of the MRUs will emphasize research aimed at developing and evaluating therapies for botulism.	Ongoing, innovative projects that address this action item include: 1) Investigation of the effect of human immune system genetic polymorphisms on the response to Shigella vaccine components; results will contribute to the rational design of effective vaccines; 2) Retrospective study of the emergence of AR Salmonella enteritidis, and 3) Two additional studies focused on the emergence and transmission of AR zoonotic bacteria.
NIH	Challenge Grants: Biodefense Product Development	To facilitate collaborative partnerships between government and the private sector for further development of already identified products against NIAID Category A, B and C high priority pathogens and all stages of product development against Severe Acute Respiratory Syndrome (SARS), including vaccines, adjuvants, therapeutics, diagnostics and research resources.	Multiple awards made in 2005, including "Broad-spectrum antagonist of superantigen toxins", "Development & manufacture of an MDR tuberculosis vaccine", "Multivariate pathogen diagnostic products" and "Recombinant antigen mutiagent diagnostic assays."
NIH	NIAID intramural Laboratory of Clinical Infectious Diseases, Tuberculosis Research Section	The Tuberculosis Research Section is an integrated group of chemists, clinicians, and microbiologists dedicated to improving the chemotherapy of tuberculosis.	Ongoing. Section scientists are currently studying the evolution of multidrug resistance in patients in South Korea. A natural history clinical research protocol was initiated in 2006 at the Masan National Tuberculosis Hospital in South Korea for multidrug-resistant TB patients and has enrolled several hundred volunteers in an effort to understand factors that contribute to the development of this condition. In addition, this patient cohort has allowed an examination of the occurence of XDR (eXtensively Drug Resistant) disease in patients who have failed chemotherapy completely.
NIH	NIAID intramural Laboratory of Clinical Infectious Diseases, Clinical Mycology Section	The Clinical Mycology Section conducts research to determine molecular mechanisms of azole resistance in clinical isolates of the pathogenic yeast, Candida glabrata.	Ongoing. In 2006, section scientists reported the first description of a mechanism by which fluconazole resistance in Candida glabrata arises during therapy. In ten patients a single nucleotide mutation in the gene coding for the transcriptional regulator, CgPDR1, increased the transcription of two drug transporters and increased drug efflux so significantly that fluconazole susceptibility decreased at least four fold.
NIH	NIAID intramural Laboratory of Human Bacterial Pathogenesis, Pathogen Molecular Genetics Section	The Pathogen Molecular Genetics Section studies the pathogen-polymorphonuclear neutrophil interface at both the cell and molecular levels to provide information critical to our understanding, treatment, and control of human diseases caused by bacteria. The section's overarching goal is to develop and/or promote development of enhanced diagnostics and better prophylaxis and therapeutics for pathogens such as community-associated methicillin-resistant S. aureus (CA-MRSA).	Ongoing. In 2006, section scientists reported their surprising findings regarding the role of a bacterial toxin called PVL in the pathogenesis of CA-MRSA. This toxin is epidemiologically linked to CA-MRSA outbreaks and the presumptive reason for its virulence, though its role had not been proven. Section research indicated PVL does not play a major role in CA-MRSA infections and thus fails to explain the increased incidence and severity of CA-MRSA disease.
NIH	NIAID intramural Laboratory of Human Bacterial Pathogenesis, Pathogen-Host Cell Biology Section	The Pathogen-Host Cell Biology Section studies the mechanisms of the formation of biofilms in chronic infections with staphylococci with a long-term objective to provide the scientific basis for the development of drugs interfering with these mechanisms. Such drugs would be useful in anti-staphylococcal therapy to both enable the immune system fight the infection and increase the efficiency of common antibiotics.	Ongoing. In 2006, a major focus of the section was on cell population density-dependent regulation of gene expression, or quorum sensing, an important determinant of bacterial pathogenesis.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	NIAID intramural Laboratory of Malaria and Vector Research, Malaria Genetics Section	Section research addresses malaria drug resistance, antigenic variation, and disease virulence. Discoveries in these areas will support the development and evaluation of new diagnostic tools, antimalarial strategies, and candidate molecules for vaccines. Strains of malaria that are resistant to chloroquine have become a major problem and section scientists are seeking the exact resistance mechanism to support searches for new antimalarial compounds that can reverse or circumvent it.	Research is ongoing to characterize molecules that determine chloroquine and quinine responses in Plasmodium parasites; dissect structure-function relationships of the PfCRT transporter responsible for chloroquine resistance in Plasmodium falciparum parasites; and evaluate candidate genes in a chromosome locus recently shown to affect the quinine response of Plasmodium falciparum.
USDA	Develop a fundamental understanding of the process of antimicrobial resistance in order to prevent the spread of unwanted resistant factors among the microorganisms that live normally in the gut of swine and cattle	ARS used continuous culture models of gut bacteria to determine the effect of the drug vancomycin on bacteria within the continuous culture model and within the gut of animals. Although ARS previously demonstrated that growth of certain vancomycin-resistant microorganisms was prevented in the model by the bacterial mixture, ARS found that a sub-therapeutic concentration of vancomycin in the growth media will allow these microorganisms to survive in the culture. This information will be used to determine antimicrobial dose and duration regimens that are therapeutically effective but limit the spread of antibiotic resistant bacteria, and will ultimately lead to more appropriate approaches to using antibiotics in food animal agriculture.	Completed Poole, USDA-ARS: College Station, TX.
USDA	Determination of the persistence of antimicrobial resistant pathogens in the environment	The persistence of AR bacteria following the cessation of use of a given antibiotic is a problem for the development of effective intervention strategies to combat antimicrobial resistance. In collaboration with the FDA Center for Veterinary Medicine, ARS examined the antimicrobial resistance patterns of disease causing strains of *Escherichia coli* from newborn pigs experiencing diarrhea. ARS found that 53% of the isolates were resistant to chloramphenicol, a broad spectrum antibiotic that has been banned for use in food animals in the United States since the mid 1980s. This information will help to determine the factors that govern the persistence of resistance genes once an antibiotic is no longer used in animal agriculture.	Completed : Bischoff USDA-ARS College Station, TX.
USDA	Assessment of the effect of penta-resistant bacteria on virulence and/or colonization	ARS challenged broiler chicks on the day of hatch with either a sensitive or penta-resistant Salmonella typhimurium DT104 and determined that penta-resistant bacteria did not cause clinical illness in broiler chicks. However, ARS did observe a significant increase in the numbers of birds that were colonized in the penta-resistant group. In contrast to in vitro studies, these data indicate that acquisition of multiple resistance does affect colonization rates but may affect the numbers of bacteria that may reach the food chain.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Characterization of Salmonella serotypes on their ability to cause disease in animals and to acquire and disseminate AR genes	We determined that Salmonella serotypes differ in their ability to persist within the host and environment and have determined that both integrons (mobile genetic elements) and plasmids, play a role in dissemination of resistance genes.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	To evaluate the effect of media, temperature, and culture conditions on the species population and antimicrobial resistance of *Enterococcus*.	Although optimal growth conditions for Enterococcus are well-established, a paucity of information exists on the influences of growth conditions on the overall population or antimicrobial resistance of Enterococcus. In this study, the effect of temperature, culture media and enrichment period were examined. Data indicated that increased temperature favored the selection of E. faecium and *E. hirae*, while lower temperature (37oC) favored growth of *E. faecalis*, *E. casseliflavus*, and *E. durans*. In addition, significantly lower numbers of E. faecalis were isolated from Enterococcosel agar while higher numbers of *E. faecium* were isolated from Enterococcosel agar. For antimicrobial resistance, significant differences were found in the number of ciprofloxacin, linezolid or nitrofurantoin resistant *E. faecalis* and linezolid or Synercid resistant *E. faecium* due to media. Temperature influenced the number of bacitracin, flavomycin, gentamicin, nitrofurantoin, penicillin, streptomycin or tetracycline resistant *E. faecalis* and gentamicin, kanamycin.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Characterization of erythromycin resistance in enterococci isolated from swine farms using different regimens of tylosin	The effect of tylosin use on erythromycin resistant enterococci isolated from farms was investigated. Results from the study suggested that although resistance was higher on a farm where tylosin was used as a growth promotant, a few resistant enterococci also persisted on a farm where no antimicrobials were being used. Isolates from farms were analyzed for antimicrobial resistance gene content as well as genetic determinants for dissemination of resistance.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Evaluation of prevalence and antimicrobial susceptibility of *E. coli* isolated from fruits and vegetables	In collaboration with scientists from USDA-AMS, we are evaluating the prevalence and antimicrobial susceptibility of generic *E. coli* isolated from fruits and vegetables collected from different regions of the US. This information will be useful for determining the effect of antimicrobials on *E. coli* isolated from these sources and the potential impact that these bacteria may have on consumer health.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Establish a model for quantitative determination of rates of antimicrobial resistance acquisition	The objective of the study was to determine the frequency of spontaneous acquisition of resistance to select antibiotics by *Salmonella typhimurium* when grown in pure culture in a glucose limited continuous flow culture at slow (D= 0.025 h-1) or fast (D=0.27 h-1) dilution rates. Results suggest that spontaneous acquisition of resistance to the select antibiotics was highly unlikely regardless of growth rate or exposure to lethal or sublethal antibiotic concentrations. Future studies are underway to expand the model to a mixed microbial ecosystem containing transmissible genetic elements.	Completed Food and Feed Safety Research Unit, ARS, College Station, TX.
USDA	Investigate the effect of ionophore feeding (long-term) on pathogen populations and antimicrobial susceptibility in stocker cattle	A collaborative project with the USDA-ARS Dale Bumpers Small Farm Research Center is being conducted determine the effect of long-term ionophore feeding on pathogen populations and antimicrobial susceptibility in stocker cattle.	Completed Edrington Food and Feed Safety Research Unit, ARS, College Station, TX.
USDA	Impact of Diet and Gut Microbial Ecology on Foodborne bacterial pathogens and autimicrobial resistance in farm animals.	The project goal is to identify factors affecting persistence of antibiotic resistance genes and other genetic determinants among normal and pathogenic enteric bacteria.	Ongoing. We have found that low (sub-Mic) levels of the antimicrobial carbadox stimulate 100-fold increases in the in vitro transfer of natural resistance to the antibiotic tylosin.Preharvest Food Safety and Enteric Diseases, ARS, Ames, Iowa.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Surveillance of antibiotic resistance in normal enteric bacteria	The project goal is to determine tetracycline resistant genotypes, species identities, and resistance "baseline' levels of commensal bacteria in the swine intestinal tract. Currrent research aims to evaluate the transmisibility of resistance between *M. elsdenii* strains and other intestinal bacteria.	Ongoing. We found that Megasphaera elsdenii strains are multiply drug resistant. Further, strains contain hybrid (recombinant) tetracycline resistant genes. Thus M. elsdenii is a potential site for evolution of antibiotic resistance as well as for the persistence of resistance in the swine intestinal tractPreharvest Food Safety and Enteric Diseases, ARS, Ames, Iowa.
USDA	To assess the movement of bacteria and their realetd genetic elements in an animal production environment and adjacent waterway	Fecal, water and environmental samples are being collected from waterways adjacent to animal production/housing facilities and cultured for Salmonella, Campylobacter, enterococci, and generic E. coli. Isolates are being characterized at the molecular and phenotypic level.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To assess the gene variability associated with resistant versus susceptible strains of Salmonella, Campylobacter, Enetrococci and *E. coli*	A microarray chip has been developed that can screen for almost 800 reistance and virulence genes among the four bacterial species. Additional genes are being added for other bacteria.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Prevalence of food borne and commensal pathogens in wild birds	Fecal samples from approximately 175 wild birds were tested for the presence of Campylobacter, E. coli, Enterococcus, and Salmonella. Samples were negative for Salmonella but a few isolates of Arcobacter sp. were detected.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Phenotic and genoptypic characterization of isolates from the intestine and organs external to the gut in broilers	Salmonella was isolated from internal and external broiler chicken samples and susceptibility tested.	Ongoing. Most of the samples that were resistant to two or more antimicrobials were from internal samples while all of the pan-susceptible isolates were from external samplesBacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Assess the ability temperature has on survival of resistant versus sensitive bacteria.	A pan-susceptible and multiple-rsistant strains were compared for their ability to survive following challenge of poultry exposed to vaerious room temperatures.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Study the role of tetracycline resistance in Campylobacter species.	Tetracycline resistance appear to be common among bacteria particularly when multiple resistance is detected. Our goal is to study the presence of, and characterize, teracycline resistant genes among Campylobacter species.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Characterize mechanisms of resistance to extended spectrum b-lactams in Salmonella from animal sources	Recently, the numbers of Salmonella isolates resistant to the third generation cephalosporins have increased. To investigate the increase in resistance, a diverse group of Salmonella serotypes resistant to ceftiofur was selected. Those strains were analyzed for the presence of the CMY-2 AmpC type b-lactamase gene. The majority of strains contained the CMY-2 gene. Most of the strains also contained large plasmids and are being subjected to Southern analysis to determine the location of the CMY-2 gene. The strains were also analyzed for the presence of the integron 1 gene, intI1. Most strains positive for intI1 were Salmonella serotype Newport, Heidelberg, or Typhimurium.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Determine the effect of antimicrobial selective pressure on the rate of spread of *Salmonella typhimurium* in poultry	Salmonella strains have arisen that are resistant to multiple antimicrobials including 3rd generation cephalosporins. The ability of those strains to be transmitted between hosts and under antimicrobial selective pressure is presently unknown. Two Salmonella strains (one pan-susceptible and one resistant to 12 antimicrobials used in the NARMS program) were compared by a natural transmission study in chickens in the presence of MIC levels of chlortetracycline (tet). The percentage of positive cloacal swabs from birds exposed to the resistant strain indicated that more birds were positive when tet treatment was administered. Cloacal swabs from the susceptible strain exposed birds indicated that more birds were positive in the absence of tet treatment. The same results were observed for tissues at necropsy on D10. Results indicated that resistant strain did not transmit faster in the presence of tet, and suggested that use of tet had a protective effect on tissue colonization.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Develop an assay for the detection of horizontally acquired antimicrobial resistance genes in Salmonella and other bacteria	Previously, PCR techniques and Southern analysis have been used to identify specific resistance genes. In order to increase the speed, efficiency, and sensitivity and to broaden the applicability of these techniques, a DNA microarray to perform multiple simultaneous assays for a broad range of antimicrobial resistance genes is being designed to incorporate current PCR product probes as well as synthetic oligonucleotides. These microarrays will be able to assay the antimicrobial resistance gene content of any number of diverse bacterial species, especially those under NARMS surveillance. This information can be used by other scientists when they study mechanisms of resistance among bacterial species.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To phenotypically and genotypically characterize Salmonella serotype Newport identified from NARMS 2000 and 2001 collection of isolates	Between 2000 and 2001, the animal arm of NARMS recovered a total of 241 Salmonella newport non-diagnostic (slaughter and on-farm) isolates. MDR S. newport isolates were recovered more frequently than pan-susceptible isolates and most of the MDR isolates were resistant to > nine antimicrobials. None of the Newport isolates contained Class 2, Class 3, or Class 4 integrons (intI2, intI3, or int4, respectively). However, Class I (intI1) integrons were identified in most of the animal species regardless of whether they were MDR or pan-susceptible. Large and small plasmids were identified mainly in the MDR Newport isolates. By PFGE analysis, Newport appears to be heterogeneous among multiple animal species, but homogeneous in a particular species. These data can be used for comparison with isolates obtained from human outbreaks to determine if a particular animal species served as the source of infection.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Exploring opportunities for technology transfer to the field of human medicine	The project goal is to determine if *M. elsdenii* is a normal bacterial inhabitant of the human GI tract and if this bacterium can be used as an indicator of enteric species in humans for antibiotic resistance status. Due to low population levels, *M. elsdenii* was found not to be suitable.	Completed. Preharvest Food Safety and Enteric Diseases, ARS, Ames, Iowa.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Assess the occurrence of Salmonella serotype Typhimurium DT104 in retail ground beef	Salmonella was isolated from 3.5% of samples and eight serotypes were identified including Typhimurium. Phage typing indicated that they were DT104A, a subtype of DT104. Generic *E. coli* was also isolated from 25% of samples. Comparison of antimicrobial resistant profiles between Salmonella and *E. coli* did not indicate that genes were being transferred among isolates. These data indicate that DT104A can be isolated from ground beef but the significance is unknown. Further, these multi-resistant *E. coli* are infrequently found in ground beef. This information can be used by other scientists and the beef industry for designing and implementing reduction and control programs.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Evaluate the prevalence and antimicrobial susceptibility of *E. coli* isolated from fruits and vegetables	Although a number of studies have determined levels of resistant bacteria on meat items from grocery stores, few studies have been conducted on the prevalence of bacteria from fruits and vegetables. In collaboration with scientists from USDA-AMS, we evaluated the prevalence and antimicrobial susceptibility of generic *E. coli* isolated from fruits and vegetables collected from different regions of the US and determined that resistance to 17 different antimicrobials among these *E. coli* is low.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Determine the presence of *E. coli* 0157:H7 in swine	Data indicated that is was possible to isolate *E. coli* 0157:H7 from the colons of pigs presented at slaughter, although the recovery rate was low. Even though the recovery rate was low, the presence of 0157:H7 may have a significant impact on human health if contaminated meat is handled or consumed. Further studies are required to determine the true prevalence and risk of *E. coli* 0157:H7 in swine. This information can be used by other scientists and the swine industry for designing and implementing reduction and control programs.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA. and ERRC, Wyndmoor PA.
USDA	Assess the prevalence of *E. coli* 0157:H7 in downer cows	As a team member, the laboratory participated in a study to assess the prevalence of *E. coli* 0157:H7 in downer cows. Data indicated that 4.9% of downer cows versus 1.5% of health cows harbor *E. coli* 0157:H7 in their colons. Not all isolates were clonal, resistance to antimicrobials was low and very little multiple resistance was observed. These data implicate downer cows as having a higher prevalence of *E. coli* 0157:H7 than healthy cows and may affect the use of downer cows as sources of meat.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Determine the effect of three feed-based antimicrobials (apramycin, carbadox, and tetracycline) on the development of antimicrobial resistance in generic *E. coli*	Resistance to tetracycline in *E. coli* varied widely by sample, group, and trial. However, a significant increase in the percentage of resistant isolates was observed in piglets fed antimicrobials when compared to controls. Resistance to apramycin also increased in piglets when compared to controls. However, upon removal of apramycin, resistance in *E. coli* declined. Resistance to carbadox remained unchanged after feeding carbadox when compared to controls. Piglets fed low doses of antimicrobials demonstrated improved growth when compared to controls. These data are useful for veterinarians, pharmaceutical manufacturers, and scientists as they devise ways to limit the development of resistance to antimicrobials while maintaining animal health.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Characterize antimicrobial resistance, species, and genetic diversity of Campylobacter isolated from feedlot cattle	In collaboration with scientists from USDA-APHIS-VS-CEAH, antimicrobial resistance was examined in Campylobacter isolates from feedlot cattle as part of a NAHMS study. Results indicate that a majority of the isolates were susceptible to the antimicrobials that were tested and that there is significant genetic diversity among isolates. These data provided a significant overview of antibiotic resistance among Campylobacter from healthy beef cattle across the US. This work will be useful to beef producers, regulatory agencies and researchers in antimicrobial resistance.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Characterize antimicrobial resistance and species of Campylobacter isolated from dairy cattle	In collaboration with scientists from USDA-APHIS-VS-CEAH, antimicrobial resistance was examined in Campylobacter isolates from US dairy cattle as part of a NAHMS study.	Completed. Results indicate that a majority of the isolates were susceptible to the antimicrobials tested. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To increase recovery of Campylobacter from various sources	Because of the fastidious nature of Campylobacter, recovery from meat or other sources is difficult. We developed an enhanced methods for recovering Campylobacter from chicken carcass rinsates by employing a centrifugation step of the rinsate prior to enrichment in culture media. This resulted in a >50% increase in the recovery of Campylobacter. This is significant in that previous methods were leading to the isolation and under reporting of Campylobacter in samples. This work will be useful to scientists involved in Campylobacter research.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Determine the prevalence and level of Campylobacter in parents (breeders) and offspring (broilers) of commercially reared pigs	Studies were conducted to determine the prevalence and level of Campylobacter in parents (breeders) and offspring (broilers) of commercially reared pigs Prevalence of Campylobacter ranged from 42 to 100% positive in three broiler offspring flocks (90% of breeders were shedding).	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To evaluate the prevalence and antimicrobial resistance of enterococci isolated from retail food items	In a study of retail food (meat, vegetables, and fruit) collected from grocery stores in NE Georgia, enterococci were isolated, identified to species, and tested for antimicrobial susceptibility. Results indicated that although enterococci were prevalent among food items, resistance to antimicrobials used in human medicine was very low (linezolid, gentamicin, ciprofloxacin) or nonexistent (vancomycin). This was the first study analyzing enterococci isolated not only from meats, but fruits and vegetables as well. This work will be useful to scientists involved in Enterococcus research as well as regulatory agencies and the industry as they develop and implement mitigation strategies.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To evaluate antimicrobial resistance and virulence of enterococci isolated from retail food items	In a study of retail food (meat, vegetables, and fruit) collected from grocery stores in NE Georgia, enterococci were isolated, identified to species, and tested for antimicrobial susceptibility and presence of virulence determinants.	Completed. Results indicated positive statistical associations (significance level = 0.05) between several virulence genes and bacitracin resistance, erythromycin resistance, lincomycin resistance and tetracycline resistance. Negative correlations were observed among many of the virulence attributes and ciprofloxacin, erythromycin, flavomycin, gentamicin, kanamycin, and tylosin resistance. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	To evaluate prevalence of streptogramin resistance in enterococci from animals.	In this study, prevalence and mechanisms of streptogramin resistance in enterococci from animals and the environment was investigated. From 2000-2004, enterococci were isolated from poultry carcass rinsates, fruits, vegetables, retail meats, and environmental rinsates or from swine and cattle fecal samples collected on-farm.	Ongoing. Data indicated that Q/D resistance among enterococci from animals remains low even with the long use of virginiamycin and suggests that use in animal production does not contribute to the observed development of resistant bacteria recovered from humans. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Characterize erythromycin resistance in enterococci isolated from swine farms using different regimens of tylosin	The effect of tylosin use on erythromycin resistant enterococci isolated from farms was investigated. Results from the study suggested that although resistance was higher on a farm where tylosin was used as a growth promotant, a few resistant enterococci also persisted on a farm where no antimicrobials were being used. Isolates from farms were analyzed for antimicrobial resistance gene content as well as genetic determinants for dissemination of resistance. These data provide insight as to the development and persistence of resistance on-farm and will be useful to research and industry scientists as they develop and implement Enterococcus mitigation strategies.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Characterize aminoglycoside resistance among enterococci isolated from poultry	Aminoglycoside antimicrobials are of interest due to their use in both animals and humans. In this study, resistance to aminoglycosides in enterococci from poultry samples was examined. High-level gentamicin, kanamycin, and streptomycin resistance was found in 23%, 41%, and 19% of the isolates, respectively. Of the ten aminoglycoside resistance genes examined, five were identified in the isolates using PCR. Seven resistant *E. faecalis* isolates were negative for all genes tested suggesting that additional resistance genes may exist. Phylogenetic analysis revealed that the isolates were genetically different with little clonality. Data from this study suggest that enterococci from poultry are diverse and contain potentially unidentified aminoglycoside resistance genes. This work will be useful to scientists involved in Enterococcus research as well as the industry as they develop and implement mitigation strategies.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To characterize 3rd generation cephalosporin resistant Salmonella from animal sources.	We characterized the strains and resistance mechanisms of 3rd generation cephalosporin resistant *Salmonella* in the United states and found that the CMY-2 gene is the most common mechanism by which salmonellae acquire this resistance in the US. This is in contrast to Europe where it is the Extended Spectrum Beta-Lactamase (ESBL). Furthermore, we found that isolates carrying the CMY-2 gene are significantly more likely to multiple drug resistant, and that certain *Salmonella* serotypes were more likely to carry the resistance. Third generation cephalosporins are important antimicrobials used to treat severe infections in both humans and animals. The research resulted in a predictive diagnostic test for multiple drug resistant Salmonella. Turkeys, horses, cats and dogs are significantly more likely to have these isolates than cattle, swine, chicken and exotics. The multiple drug resistance identified was found to be encoded on a large transferable plasmid.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	To characterize *Salmonella enterica* serovar Agona Slaughter Isolates from the Animal Arm of the National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS): 1997 through 2003.	The objectives of this study were to establish baseline information for *S.* Agona prevalence in food animal slaughter samples from 1997 through 2003. *Salmonella* Agona isolates exhibited increased resistance to amoxicillin/clavulanic acid, ampicillin, cefoxitin, ceftiofur, cephalothin, and chloramphenicol, and nalidixic acid.	Completed. A single isolate was resistant to ceftriaxone. Multiple drug resistance (MDR; resistance >2 antimicrobials) was exhibited in 57% of the S. Agona isolates and 22% of these S. Agona isolates were resistant to 5 or more antimicrobials. A majority of the S. Agona isolates originated from cattle and represented 77% of the MDR isolates resistant to 5 or more antimicrobials. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To monitor serotypes and development of resistance to Ciprofloxacin in *Salmonella*.	The first Salmonella isolate resistant to Ciprofloxacin (a fluoroquinolone) was identified and characterized. Salmonella serotype Niakhar is a rarely isolated serotype and only five isolates have been acquired as part of NARMS. These isolates originated either from a dog or cattle, and only one (cattle isolate) was resistant to Ciprofloxacin. The presence of a multiple resistance gene (MAR), integrons and transferable plasmids were identified. While resistance was localized to the plasmid, only two of the resistance genes were located within an integron. Molecular analysis of the isolates also indicated more heterogeneity between isolates and only two (but not the multiple resistant one) appeared to be related. Impact: Further characterization of this isolate, as well as continued monitoring for an increase in the number of S. Niakhar and other Ciprofloxacin resistant serotypes over time will be done.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	To study the ability of resistant strains to have a competitive persistance advantage	Recently, Salmonella strains have arisen that are resistant to multiple antimicrobials including 3rd generation cephalosporins. The ability of those strains to be transmitted between hosts and under antimicrobial selective pressure is presently unknown. Two Salmonella strains (one pan susceptible and one resistant to 12 antimicrobials used in the NARMS program) were compared by a natural transmission study in chickens in the presence of MIC levels of chlortetracycline (tet). The percentage of positive cloacal swabs from birds exposed to the resistant strain indicated that more birds were positive when tet treatment was administered. Conversely, cloacal swabs from the susceptible strain exposed birds indicated that more birds were positive in the absence of tet treatment. The same results were observed for tissues at necropsy on D10. These results indicated that resistant strain did not have an increased transmissibility in the presence of tet and suggested that use of tet had a protective effect on tissue colonization.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Evaluate the effect of media, temperature, and culture conditions on the species population and antimicrobial resistance of enterococci	Although optimal growth conditions for enterococci are well-established, a paucity of information exists on the influences of growth conditions on the overall population or antimicrobial resistance of enterococci. In this study, the effect of temperature, culture media and enrichment period was examined. Data indicated that increased temperature favored the selection of E. faecium and E. hirae, while lower temperature (37oC) favored growth of *E. faecalis*, *E. casseliflavus*, and *E. durans*. In addition, significantly lower numbers of *E. faecalis* were isolated from Enterococcosel agar while higher numbers of E. faecium were isolated from Enterococcosel agar. For antimicrobial resistance, significant differences were found in the number of ciprofloxacin, linezolid or nitrofurantoin resistant *E. faecalis* and linezolid or Synercid resistant *E. faecium* due to media. Temperature influenced the number of bacitracin, flavomycin, gentamicin, nitrofurantoin, penicillin, streptomycin or tetracycline resistant *E. faecalis* and gentamicin, kanamycin.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Characterize *Salmonella* isolated from cattle with reduced resistance to 3rd generation cephalosporins.	To investigate this, *Salmonella* isolated from cattle in 2000-2004 (n=3984) were tested for reduced resistance to 3rd generation cephalosporins. 98 were identified and were further characterized by analysis for Extended Spectrum Beta-lactamases (ESBLs) production. None were found to be harbor ESBLs. Genetic analysis (PFGE, PCR, microarray, etc.) are being performed.	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Quantitative measurement of antimicrobial resistance gene loads in samples	This study will optimize and evaluate real-time PCR in the quantitafication of a.r.genes in fecal samples. It will assess the accuracy and precision for quantifying the association between antimicrobial use and antimicrobial resistance.	Awarded in 2004 by CSREES, NRI's 32.1 Epidemiologic Approaches for Food Safety. R. Singer, University of Minnesota.
Action Item #68: Conduct Further Government-Wide Assessments with External Input on the Scope and Composition of AR Research To Identify Research Opportunities.			
NIH	Novel Therapeutics for Enteric Infections: A Workshop	Workshop to assess the opportunities for discovery and clinical development of novel therapeutics for enteric infections. Attendees included representatives from NHLBI, FDA, Institute for OneWorld Health, Industry and Academia.	Meeting held September 22, 2005, in Bethesda, Maryland. The current status and new opportunities were addressed by 18 invited experts. Several promising entities have been identified and some are now under preclinical development.
NIH	Emerging Clostridial Diseases Workshop	The CDC, FDA, and NIAID are planning a public workshop to develop a draft research agenda to better understand the virulence, pathogenesis, host factors, and non-antimicrobial risk factors contributing to reports of morbidity and mortality associated with Clostridium sordellii and Clostridium difficile. Additionally, our goals are to identify research needs and priorities that will enable rapid progress, as well as to develop and provide recommendations for detecting cases and conducting surveillance of diseases and organisms.	Held May 11, 2006 in Atlanta, Georgia. Meeting agenda and report can be found at: http://www.fda.gov/cder/meeting/clostridia_disease.htm.
Action Item #69: Work with the Appropriate Peer Review Structures To Ensure That the Requisite Expertise Is Applied to the Review Process To Facilitate Funding of Quality AR Research.			
NIH	The Panel on Scientific Boundaries for Review has conducted a comprehensive examination of the organization and function of the review process that is carried out by the Center for Scientific Review (CSR) at NIH. The purpose of this evaluation is to position the CSR peer review system so that it fosters expanded research opportunities, as well as permits the review system to keep pace with the accelerating rate of change in the way that health-related research is performed. This examination is being carried out in two phases, with extensive involvement of the extramural research community.	The Infectious Diseases and Microbiology IRG review by the Expert Working Group was conducted from May – August 2001 and developed a proposed set of guidelines and shared interests for new study sections. NIH's CSR has established a new Study Section, Drug Discovery and Mechanisms of Antimicrobial Resistance (DDR), within the new Infectious Diseases and Microbiology Integrated Review Group (IRG). It will review applications that are concerned with the identification of novel antimicrobia agents, including agents that could be used in bioterrorism, for the prevention and treatment of infectious diseases and the study of the evolution, mechanisms, and transmission of resistance.	NIH's CSR has established a new Study Section, Drug Discovery and Mechanisms of Antimicrobial Resistance (DDR), within the new Infectious Diseases and Microbiology Integrated Review Group (IRG). It will review applications that are concerned with the identification of novel antimicrobial agents, including agents that could be used in bioterrorism, for the prevention and treatment of infectious diseases and the study of the evolution , mechanisms, and transmission of resistance. DDR held its first meeting in June of 2004, and has met regularly thereafter.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #70: Provide To the Research Community Genomics and Other Powerful Technologies To Identify Targets in Critical Areas for the Development of New Rapid Diagnostics Methodologies, Novel Therapeutics, and Interventions To Prevent the Emergence and Spread of Resistant Pathogens. Examples Include Tools Such as Microbial Genome Sequences, Information on Comparative Genomics, DNA Chip Technology, Informatics, and Assistance in the Application and Use of These Tools.			
NIH, USDA, FDA, EPA, FDA	Microbe project interagency working group	NIAID staff is participating in the Microbe Project Interagency Working Group, which coordinates microbial genomics activities across Federal government agencies.	This working group continues to coordinate genomic activities across federal agencies, including those related to biodefense, and has also focused on issues related to genomic data release and usage, as well as on bioinformatics and microbial sequencing efforts.
FDA	Genomics and Proteomics	Research in support of the use of genomics, proteomics and other powerful technologies to identify targets in critical areas for the development of new rapid diagnostic methodologies, novel therapeutics, and interventions to prevent the emergence and spread of resistant pathogens.	Established microarray group and CBER core program (for producing and reading oligonucleotide microarray chips). Initiated several research projects related to vaccine development, AR, pathogen identification and detection. Developed a rapid typing method for Neisseria gonorrhoeae applicable to non-cultured specimens and the identification of ciprofloxacin resistant strains. Also developing rapid DNA assays to detect all four species of human malaria parasites. And developing microarray technology for detecting drug resistence among mycobacteria.
NIH	The tuberculosis research materials and vaccine testing contract (Colorado State University)	The contract provides TB research reagents to qualified investigators throughout the world, enabling them to work with consistent, high quality microbiological, immunological and genomic reagents, prepared from contagious and technically demanding mycobacterial pathogens.	At the end of FY2006, more than 150 new TB vaccine candidates had been tested under this contract, one of which has recently entered human clinical trials with several others progressing through various stages of preclinical development. In addition, research reagents, including specialized post-genomic materials, continue to be provided to researchers worldwide and are being used for drug, vaccine and diagnostic development. Contract staff collaborates with the PFGRC for the production and dissemination of mycobacterial specific molecular reagents. and with the NIH Tetramer Facility to provide mycobacterially relevant tetramers.
NIH	NIAID Pathogen Functional Genomics Resource Center (PFGRC)	The PFGRC was established in FY2001 to provide and distribute to the broader research community a wide range of genomic and related resources and technologies for the functional analysis of microbial pathogens and invertebrate vectors of infectious diseases. The PFGRC was expanded to provide the research community with the needed resources and reagents to conduct both basic and applied research on microorganisms responsible for emerging and re-emerging infectious diseases and those considered agents of bioterrorism and organisms considered agents of bioterrorism. The number of organism-specific microarrays produced and distributed to the scientific community has increased to 28 in FY2006 and now includes arrays for viruses, bacteria, fungi, and parasites.	Ongoing. See http://www.niaid.nih.gov/dmid/genomes/pfgrc/default.htm for details.
NIH	Sequencing of whole pathogen genomes	NIAID has made significant investment in large-scale projects to sequence the genomes of medically significant bacterial, fungal, and parasitic pathogens. In addition, NIAID collaborates with other funding agencies to sequence larger genomes of protozoan pathogens such as the organism that causes malaria. A listing of currently active pathogen genome sequencing projects is available at: http://www.niaid.nih.gov/dmid/genomes/mscs/projects.htm The availability of microbial and human DNA sequences will open up new opportunities and allow scientists to examine functional analysis of genes and proteins in whole genomes and cells, as well as the host immune response and an individuals' genetic susceptibility to pathogens.	In FY2006, NIAID supported approximately 40 large scale genome sequencing projects for additional strains of viruses, bacteria, fungi, parasites, viruses and invertebrate vectors and new projects include additional strains of Borrelia, Clostridium, E.coli, Salmonella, Streptococcus pneumonia, Ureaplasma, Coccidioides, Penicillium marneffei, Talaromyces stipitatus., Lacazia loboi, Histoplasma capsulatum, Blastomyces dermatitidis, Cryptosporidium muris and, Dengue viruses, and additional sequencing and annotation of Aedes aegypti.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Influenza Genome Sequencing Project	This project was launched in 2004 and puts influenza sequence data rapidly into the public domain, enabling scientists to further study how influenza flu viruses evolve, spread, and cause disease and may ultimately lead to improved methods of treatment and prevention. This project is a collaborative effort among NIAID, NCBI/NLM, CDC, St. Jude Children's Research Hospital in Memphis and others, bringing together expertise in sequencing and bioinformatics, as well as expertise in human and avian influenza viruses to help NIAID prioritize, select and obtain strains.	As of February 2006, more than 2,000 human and avian influenza viruses taken from samples around the world have been completed and the sequence data has been made available in a public database. See http://www.niaid.nih.gov/dmid/genomes/mscs/default.htm#influenza for details.
NIH	NIAID pathogen genomics website: www.niaid.nih.gov/dmid/genomes/	The NIAID genomics website serves as a focal point to disseminate to the scientific community current information about NIAID's microbial genomics research program and related activities, including information on funding opportunities, policies, application procedures, priorities for large-scale genome sequencing projects, press releases, and currently funded large-scale genome sequencing projects.	Currently available to the scientific community.
NIH	Network on Antimicrobial Resistance in *Staphylococcus aureus* (NARSA) contract	The network includes 259 registered users including basic researchers, clinical laboratories and infectious disease clinicians involved in staphylococcal AR research. NARSA supports electronic sharing of information, a yearly investigator's meeting, and a case registry and repository of well-characterized staphylococcal isolates including the three newly emerged vancomycin resistant *Staphylococcus aureus* isolates.	The network includes approximately 79 core investigators, approximately 201 affiliates, which include basic researchers, clinical laboratorians, epidemiologists, and infectious disease clinicians involved in staphylococcal and antimicrobial resistance research. NARSA supports electronic sharing of information and meetings, integrates with CDC's surveillance system on antibiotic resistance, and supports a case registry and extensive repository of staphylococcal clinical, research, resistant, and historical isolates. The eighth annual meeting of this group took place on March 5-6, 2007. The repository has available the seven VRSA isolates noted above. A special application and approval is required to procure these isolates: www.narsa.net and http://www.niaid.nih.gov/dmid/antimicrob/.
NIH	Population Genetics Analysis Program: Immunity to Vaccines/Infections	The goal of this program is to identify associations between specific immune response gene polymorphisms/genetic variations and susceptibility to infection or response to vaccination with a focus on one or more of NIAID Category A-C pathogens.	NIAID awarded 6 Centers in 2004 and studies include examining host response to immunization against smallpox, anthrax, typhoid fever, and cholera. In FY06, these centers focused on recruitment of the samples needed for genotyping. For example, more than 1100 smallpox vaccinated individuals and controls have been recruited and blood and PBMC samples obtained for whole genome association studies in FY07.
NIH	Research Center Grant, "Structural Organization and Proteomics of TB"	The goal of this global consortium, which involved over 70 laboratories in 12 countries, was to determine and analyze the structures of over 400 functionally relevant Mtb proteins. This Center Grant ended in early FY 2006 and has been continued as a more scientifically targeted, collaborative program project grant.	To date, the consortium has determined the structures of over 60 biologically important proteins from Mtb. The structural and functional information is publicly available through web-based databases: http://www.doe-mbi.ucla.edu/TB/. Targeted studies mycobacterial proteins relevant for drug development are on-going under this grant.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Food and Waterborne Diseases Integrated Research Network (FWDIRN)	NIAID's FWDIRN network includes multidisciplinary research on all food and waterborne pathogens (bacteria, viruses, and protozoa), as well as toxins, to facilitate the development and evaluation of products to rapidly identify, prevent, and treat food and waterborne diseases that threaten public health. The network includes Immunology (IRU), Microbiology (MRU), Zoonoses (ZRU) and Clinical (CRU) Research Units. The Network is supported by a Coordinating and Biostatistics Center. One of the MRUs will emphasize research aimed at developing and evaluating therapies for botulism.	The network currently funds: • Research and development of improved diagnostics for enteric pathogens • Vaccine research on tularemia vaccine strain LVS, Shigella, and S. typhi • Therapeutics research for botulinum neurotoxin intoxication and for infections with Shiga-toxin producing E. coli (STEC) • Research on diagnostics for botulism • Clinical study to improve response to S. typhi vaccination • Research on the molecular evolution and transmission of antibiotic-resistance genes in enteric pathogens • Animal model development for botulinum neurotoxins, STEC-mediated HUS, Campylobacter-mediated enteritis, and Crohn's disease • Strain repository for STEC
NIH	Structural Genomics of Pathogenic Protozoa	NIAID has cofunded the Structural Genomics of Pathogenic Protozoa (http://depts.washington.edu/sgpp/) to provide the three dimensional structure of many proteins deduced from the genome information of the trypanosomatid and Plasmodium species. This will be valuable information for future drug and vaccine discovery design, as well as information for the discovery of new protein folds and function.	In 2006, the focus of this project will continue to be structures of potential drug targets in pathogenic protozoa, including protozoan pathogens of potential Biodefense concern. However, a greater emphasis will be placed on aiding drug discovery efforts, including the structural basis for antimicrobial resistance in these pathogens. There have been several recent publications describing structural analysis to aid drug discovery, including a nucloside 2-deoxyribosyl transferase from Trypanosoma brucei, a ribose 5-phosphate isomerase from Plasmodium and the structure of the MTIP-MyoA invasion motor from Plasmodium.
NIH	Malaria Research and Reference Reagent Resource (MR4) Center	The MR4 continues to provide expanded access to quality controlled reagents for the international malaria research community. The website averages more than 5,000 visitors per month, and acquires and distributes more than 100 items per month to researchers worldwide. The MR4 has compiled a Laboratory handbook on "Methods in Malaria Research", available as a resource to scientists. Also, MR4 is acquiring standard sets of parasitized blood smears for diagnostic training to scientists particularly in endemic regions. A program is also in place for coordinating site(s) in African countries, with the vision of expanding availability of MR4 resources to endemic country scientists.	In FY 2005 the MR4 was recompeted, and a new award made to the American Type Culture Collection.
NIH	NIAID Microbial Sequencing Centers	The Microbial Genome Sequencing Centers address NIAID's need for sequencing of microorganism and invertebrate vectors of disease. The MGSCs provide rapid and cost efficient resources for production of high quality genome sequences of pathogens considered agents of bioterrorism (NIAID category A-C priority list), or causing emerging and re-emerging infectious diseases, their closely related organisms and clinical isolates and invertebrate vectors of disease.	These Centers have the capacity and are responding to scientific community and national and federal agencies' priorities for genome sequencing, filling in sequence gaps and therefore, providing genome sequencing data for multiple usages including understanding biology of microbe, forensic strain identification and identifying targets for drugs, vaccines and diagnostics. See http://www.niaid.nih.gov/dmid/genomes/mscs/default.htm.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Bioinformatics Resource Centers	NIAID Bioinformatics Resource Centers are designed to develop, populate, and maintain comprehensive, relational databases to collect, store, display, annotate, query, analyze genomic, functional genomic, structural and related data for microorganisms responsible for emerging and re-emerging infectious diseases and for those considered agents of bioterrorism. The center will also develop and provide software tools.	Eight Centers were funded in FY04: http://www.niaid.nih.gov/dmid/genomes/brc/default.htm. In FY 2006, each publicly accessible BRC web site has continued to be developed, the user interfaces have been improved and a variety of genomics data types have being integrated, including gene expression and proteomics information, host/pathogen interactions and signaling/metabolic pathways data. Visit http://www.brc-central.org for additional information.
NIH	Biodefense Proteomics Research Centers	NIAID Proteomic Centers are intended to develop and enhance innovative proteomic technologies and methodologies and apply them to the understanding of the pathogen and/or host cell proteome for the discovery and identification of novel targets for the next generation of drugs, vaccines, diagnostics and immunotherapeutics against microorganisms considered agents of bioterrorism.	Seven Centers were funded in 2004: http://www.niaid.nih.gov/dmid/genomes/prc/default.htm. In FY06 more than 2400 potential new pathogen targets for vaccines, therapeutics, and diagnostics were identified while more than 5700 new corresponding host targets were generated. Visit http://www.proteomicsresource.org/ for additional information.
NIH	Scientific Advance: Elusive drug target in M. tuberculosis has been identified.	INH remains the most effective drug against TB. However, resistance against INH is increasing despite the use of multi-drug regimens against this disease. Since it cannot be presumed that a drug only has one target, it is important to characterize what bacterial components are primarily responsible for its action. With this information, it is now possible to characterize the exact effect of the drug on the bacterial metabolism, better understand how bacteria creates resistance against INH, construct new versions of the drug that are effective even against mutated target drugs and also generate appropriate companion drugs to INH that make it more difficult for Mtb to become resistant. The proof that InhA is the primary target for INH is a new milestone in TB research and has been the focus of intense investigation since the early 1990s with suggestions on its target published in major scientific journals (Nature and Science).	Published Results: Vilcheze C, Wang F, Arai M, Hazbon MH, Colangeli R, Kremer L, Weisbrod TR, Alland D, Sacchettini JC, and Jacobs WR Jr: Transfer of a point mutation in Mycobacterium tuberculosis inhA resolves the target of isoniazid. Nat Med. 2006 Sep;12(9):1027-9. Epub 2006 Aug 13.
NIH	Scientific Advance: Comparative genomics study reveals Staphylococcus epidermidis virulence factors.	NIAID scientists used microarray-based genome-wide comparison of clinical and commensal S. epidermidis strains to identify putative virulence determinants, including antimicrobial resistance genes. Their study revealed high genetic variability of the S. epidermidis genome, new markers for invasiveness of S. epidermidis, and potential targets for drug development against S. epidermidis infections.	Published results: Yao Y, Sturdevant DE, Villaruz A, Xu L, Gao Q, Otto M. Factors characterizing Staphylococcus epidermidis invasiveness determined by comparative genomics. Infect Immun. 2005 Mar;73(3):1856-60.
USDA	The role of calf-adapted E.coli in maintenance of antibiotic resistance in dairy calves	This project will use a combination of in vitro and in vivo comparison studies to study the fittness differences between SSuT and non-SSuT strains. Gene knockout studies will also be conducted.	Awarded in 2004 by CSREES, NRI's 32.0 Ensuring Food Safety. D. Call, Washington State University.
USDA	Comparative genomic analysis of *Salmonella* serotypes.	A multi serotype *Salmonella* whole genome microarray has been obtained for this study. To determine the genetic elements responsible for these variations, *Salmonella* serotypes are analyzed by comparative genomic hybridization (CGH).	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Comparative genomic analysis of *Campylobacter* subtypes.	To identify and trace *Campylobacter* isolates responsible for animal and human infections, a multi strain *Campylobacter* whole genome microarray has been obtained and is being used for comparative genomic hybridizations (CGH).	Ongoing. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #71: Encourage Sharing of AR Data Between Industry and the Research Community, Including Genomics and Other Technologies.			
NIH, DoD	Collaboration on genomics technologies and resources	NIAID continued its agreement with the Defense Advanced Research Project Agency (DARPA) in support of genomics efforts targeted at pathogens of potential bioterrorist threat.	Through this collaboration with DARPA large-scale genome sequencing projects for *Brucella suis* and *Coxiella burneti* have previously been completed. In 2006 sequenicng of a multi-drug resistant strain of plague from Madagascar was completed (see reference: Ravel et al., 2007, PLoS ONE, Issue 3:e309). In addition, DARPA provides funds for the Poxvirus Bioinformatics Resource Center (http://www.poxvirus.org). This resource for the scientific community provides sequencing and functional comparisons of orthopox genes and the design and maintenance of a relational database to store, display, annotate, and query genome sequences, structural information, phenotypic data and bibliographic information. It also serves as a repository of well-documented viral strains.
FDA	See Action Item #30: (Anti-Infective Drugs Advisory Committee)	See Action Item #30: (Anti-Infective Drugs Advisory Committee)	See Action Item #30: (Anti-Infective Drugs Advisory Committee)
FDA	International Collaboration	Participated in and supported international efforts to develop improved vaccines and drugs to prevent multi-drug resistent tuberculosis. Research is being conducted in collaboration with American and Russian scientists.	Ongoing
NIH	Bioinformatics Resource Centers	NIAID Bioinformatics Resource Centers are designed to develop, populate, and maintain comprehensive, relational databases to collect, store, display, annotate, query, analyze genomic, functional genomic, structural and related data for microorganisms responsible for emerging and re-emerging infectious diseases and for those considered agents of bioterrorism and develop and provide software tools.	Eight Centers were funded in FY04 http://www.niaid.nih.gov/dmid/genomes/brc/default.htm. In FY 2006, each publicly accessible BRC web site has continued to be developed, the user interfaces have been improved and a variety of genomics data types have being integrated, including gene expression and proteomics information, host/pathogen interactions and signaling/metabolic pathways data. Visit http://www.brc-central.org for additional information.
NIH	NIAID Microbial Sequencing Centers	The Microbial Genome Sequencing Centers address NIAID's need for sequencing of microorganism and invertebrate vectors of disease. The MGSCs provide rapid and cost efficient resources for production of high quality genome sequences of pathogens considered agents of bioterrorism (NIAID category A-C priority list), or causing emerging and re-emerging infectious diseases, their closely related organisms and clinical isolates and invertebrate vectors of disease.	These Centers have the capacity and are responding to scientific community and national and federal agencies' priorities for genome sequencing, filling in sequence gaps and therefore, providing genome sequencing data for multiple usages including understanding biology of microbe, forensic strain identification and identifying targets for drugs, vaccines and diagnostics. See http://www.niaid.nih.gov/dmid/genomes/mscs/default.htm.
NIH	NIAID pathogen functional genomics resource center (PFGRC)	The PFGRC was established in FY2001 to provide and distribute to the broader research community a wide range of genomic and related resources and technologies for the functional analysis of microbial pathogens and invertebrate vectors of infectious diseases. The number of organism-specific microarrays produced and distributed to the scientific community has increased to 28 in FY2006 and now includes arrays for viruses, bacteria, fungi, and parasites.	Ongoing. See website for additional details: http://www.niaid.nih.gov/dmid/genomes/pfgrc/default.htm.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #72: Bring New Researchers into the Field, by Utilizing Appropriate Strategies such as Training and Research Opportunities.			
FDA	Fellowship Program	Combined Pediatric Infectious Diseases Fellowship formed with Children's National Medical Center, Washington, D.C.	Ongoing: First fellow to complete the program is in June 2004.
NIH	Research Scholar Development Award (RSDA)(K22)	The RSDA will provide support for postdoctoral fellows who are moving to assistant professor positions in an academic institution. The purpose of the RSDA is to ease the transition to an academic position by enabling the recipient to focus on the establishment of his/her research laboratory prior to submitting applications for grant support. This is intended to establish new young investigators in needed fields, including AR.	(PAR-02-018) released November 15, 2001; remains active.
NIH	Other ongoing training and research fellowship awards	PA-00-003 Mentored Clinical Scientist Development Award (K08) PA-00-004 Mentored Patient Oriented Research Career Development Award (K23) PA-00-005 Mid-career Investigator Award in Patient Oriented Research (K24).	Important ongoing programs are fostering the development of young scientists and clinical investigators. Recent awards include:"Concurrent HAART and Tuberculosis Treatment: Drug to Drug Interactions"
NIH	NIH Exploratory/Developmental Research Grant Award (R21)	This announcement redefines the National Institutes of Health (NIH) Exploratory/Developmental Research Grant Award (R21) mechanism, and extends its use as an investigator-initiated mechanism to a variety of Institutes and Centers (ICs) listed in the announcement. The R21 is intended to encourage exploratory and developmental research projects by providing support for the early and conceptual stages of these projects. This is an important mechanism for attracting new investigators to a field of study and providing sufficient support to allow development of preliminary data that will enable successful long-term funding.	Ongoing.
NIH	MDR-TB Included on Category C Biodefense List	Multi-drug resistant TB is a re-emerging infectious disease that is included on NIAID's category C biodefense list. Grant applications for translational research or product development are responsive to biodefense initiatives that include category C agents.	Ongoing.
NIH	Investigator-initiated small research grant award program announcement (R03)	The R03 award supports small research projects that can be carried out in a short period of time, with limited resources. This solicitation extends its use to unsolicited applications in addition to its use in individual Requests for Applications (RFA) and Program Announcements (PA). This is an important mechanism for attracting new investigators to a field of study and providing sufficient support to allow development of preliminary data that will enable successful long-term funding.	Ongoing.
VA	Proposal Regarding Antibiotic Resistance Fellowship	The Infectious Diseases Program Office proposed the initiation of a two-year VA Special Fellowship in the area of antibiotic resistance at six sites. The proposal required trainees to have completed internal medicine and infectious diseases specialty and subspecialty residency training, and would have required scientific emphasis on antibiotic resistance.	The proposal was rewritten and restructured to focus on training leaders in Terrorism Response for the Future with emphasis on antibiotic resistance. A portion of the training was to include biologic threat agents (including pandemic influenza).

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #73: Organize Conferences That Address Research Issues Relating to AR.			
CDC, EPA, FDA, NIH, USDA	National Foundation for Infectious Diseases Conference on Antimicrobial Resistance: Science, Prevention, Control	Scientific conference on Antimicrobial Resistance held annually in Bethesda, MD, sponsored by National Foundation for Infectious Diseases, in collaboration with CDC, EPA, FDA, NIH, USDA.	Organized conference in 2002, 2003, 2004, 2005, 2006 and 2007.
FDA, CDC, NIH	Antimicrobial Drug Development Public Workshop (sponsored by FDA, IDSA and ISAP)	Workshop provided information for and gained perspective from advocacy groups, industry and others on various aspects of antimicrobial drug development, including clinical trial design issues.	Workshop held April 15-16, 2004. Discussed the use of pharmacodynamic information in appropriate dose selection in clinical trials of anti-infective agents, and summarized the issues with developing antimicrobial drugs by allowing data from one serious disease to be supportive of data in another less serious disease such that sponsors would only have to perform one trial instead of two in the less serious disease. CDER resistance web site to access workshop transcripts (http://www.fda.gov/cder/drug/antimicrobial/default.htm)
USDA, FDA	American Society of Microbiology research colloquium on preharvest food safety and security	Session took place in December 2004, in Perthshire Scotland and brought together international experts in pre-harvest food safety. One issue that was discussed was Antimicrobial resistance.	Finished. Proceedings available on ASM web site.
NIH	The NIAID Summit on the State of Anti-Infective Development	The meeting was a follow-up to the Summit on Development of Infectious Disease Therapeutics, hosted by NIAID in 2000. The August summit brought together leaders from government and the pharmaceutical industry to assess the current state of antimicrobial development. A major focus of the meeting was identifying perceived barriers to new anti-infective development and determining opportunities for NIAID to work with the public and private sector to help overcome those barriers.	Meeting held August 16-17, 2004. Meeting summary posted on NIAID website at: http://www.niaid.nih.gov/dmid/drug/
NIH	Division of Microbiology and Infectious Diseases Program staff serve as external consultants or liaison to a variety of national and international TB-related groups	NIAID program staff members serve as external consultants or liaison to a variety of national and international TB-related groups. These collaborative activities inform NIAID's strategic directions for the TB Program to assure maximum utilization of NIAID resources. National groups include the Advisory Council for the Elimination of Tuberculosis (ACET), CDC's TB Clinical Trials Consortium and TB Epidemiologic Studies Consortium, and the Infectious Disease Society of America. International groups include the STOP TB Vaccine Partnership' s Diagnostic, Vaccine, Drug Development and HIV/TB Working Groups, WHO's TDR, International Union against Tuberculosis and Lung Disease (IUATLD), the Global Alliance for TB Drug Development (GATB), and several European research consortia.	Ongoing.
NIH	Novel Therapeutics for Enteric Infections: A Workshop	Workshop to assess the opportunities for discovery and clinical development of novel therapeutics for enteric infections. Attendees included representatives from NHLBI, FDA, Institute for OneWorld Health, Industry and Academia.	Meeting held September 22, 2005, in Bethesda, Maryland. The current status and new opportunities were addressed by 18 invited experts. Several promising entities have been identified and some are now under preclinical development.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Emerging Clostridial Diseases Workshop	The CDC, FDA, and NIAID are planning a public workshop to develop a draft research agenda to better understand the virulence, pathogenesis, host factors, and non-antimicrobial risk factors contributing to reports of morbidity and mortality associated with Clostridium sordellii and Clostridium difficile. Additionally, our goals are to identify research needs and priorities that will enable rapid progress, as well as to develop and provide recommendations for detecting cases and conducting surveillance of diseases and organisms.	Held May 11, 2006 in Atlanta, Georgia. Meeting agenda and report can be found at: http://www.fda.gov/cder/meeting/clostridia_disease.htm.
NIH	Bacterial Respiratory Pathogens Research Units (BRPRU)	This project supports bacterial pre-clinical and clinical studies for the diagnosis, prevention, and management of selected human bacterial respiratory pathogens.	Ongoing.
NIH	Annual meeting of the U.S.-Japan Cooperative Medical Sciences Program	In January 2007, the U.S.-Japan Cooperative Medical Sciences Program Acute Respiratory Infections Panel held their annual meeting, which was focused on antimicrobial resistance. Presentations and discussions addressed the following areas: assessing the spread and impact of drug resistant bacteria in Japan and other Asian countries; assessing the use of pneumococcal vaccines and their impact; and assessing the clinical significance of co-infections and identifying pathogenic mechanisms and new antimicrobial targets	Ongoing.
NIH, NIAID	Workshop on the Development of Broad Spectrum Therapeutics	The National Institute of Allergy and Infectious Diseases (NIAID), through the Division of Microbiology and Infectious Diseases (DMID), sponsored a Workshop on the Development of Broad Spectrum Therapeutics. The workshop was organized by the Office of Biodefense Research Affairs (OBRA) and the Office of Regulatory Affairs (ORA) of DMID, and was held on April 18, 2006 in Bethesda. Participants included scientists from academic institutions, biotech and pharmaceutical companies, as well as program staff from the NIAID, the Department of Health and Human Services (DHHS), the Department of Defense (DoD), and the Food and Drug Administration (FDA).	Meeting held on April 18, 2006. Meeting summary posted on NIAID website at: http://www.niaid.nih.gov/dmid/meetings/bst.htm
USDA	International Symposium on the Epidemiology and Control of Foodborne Pathogens in Pork	Included antimicrobial resistance- focused on research, intervention and control programs and involved industry, academia and government.	Finished. Proceedings available on National Pork Board.
USDA	Bilateral meetings between Canada and the US related to antimicrobial surveillance	Participated in a bilateral meeting in Quebec to discuss harmonization of NARMS program with the Canadian CIPARS program.	Completed.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #74: Explore the Need To Encourage Preclinical Studies on the Toxicology, Pharmacokinetics of Novel Therapeutic Agents for the Treatment of Multidrug-Resistant Pathogens And Facilitate the Transition of Potential Products from Preclinical to Clinical Studies Leading to Development by Industry of Novel Therapeutic Agents.			
NIH	Pharmacokinetics and pharmacodynamics animal model contract	This contract, awarded in June 2004, provides a resource to determine basic pharmacology and efficacy characteristics of new chemical entities in order to best evaluate candidate compounds as potential new drugs for tuberculosis and other infections. This contract will allow NIAID to provide critical support for investigator-initiated drug discovery, to stimulate private sector sponsorship of new drugs, to perform comparison (or confirmatory) studies from different sponsors, and to provide information for selection of antimicrobial drug candidates for design of clinical studies. This contract will serve as the central facility for evaluation of novel compounds for physical, pharmacokinetic, and pharmacodynamic properties.	Ongoing. Investigations of products from companies such as Sanofi-Aventis have led to renewed interest in research and development of rifapentine for tuberculosis. Pharmacokinetic evaluations of new drug combinations are planned to address regimens for treatment of drug resistant TB. Of note, data on new drug combination regimens from this preclinical research contract has informed and guided the development of new protocols for clinical trials (TB Trials Consortium) coordinated by the CDC.
**** TOP PRIORITY ****			
Action Item #75: In Consultation with Academia and the Private Sector, Identify and Conduct Human Clinical Studies Addressing AR Issues of Public Health Significance That Are Unlikely To Be Studied the Private Sector.			
NIH, NIAID	Division of AIDS Clinical Trials	Numerous trials underway that are monitoring for resistance: R. Chaisson, Johns Hopkins University, "Novel TB Prevention Regimens for HIV-Infected Adults" in South Africa. C. Whalen, Case Western Reserve, "Randomized, Phase II Study of Punctuated Antiretroviral Therapy for HIV Infected Patients with Active Pulmonary Tuberculosis and CD4 count > 350 cells/mm3." S. Abdool Karim, University of Natal, South Africa "Collaborative AIDS Programme of Research in South Africa.	Ongoing. Additional study started in 2005: (1) Sok Thim, Cambodian Health Committee: U01-AI-061736 "A Cambodian Clinical Research Network for HIV/TB" (CIPRA). This study is currently enrolling and will determine if early initiation of antiretroviral therapy impacts tuberculosis cure, survival, relapse and control of HIV in urban and rural settings. It is jointly sponsored by the French National Agency for Research on AIDS and Viral Hepatitis (ANRS) – ANRS 1295 CAMELIA. Expected total enrollment: 660. Positive cultures will be assessed for resistant TB. Additional study initiated in 2006: AIDS Clinical Trials Group study ACTG 5221 "A strategy study to determine the best time to begin ARV treatment in individuals who have HIV and TB with CD4<200 cells/mm3". TB cultures will be monitored for resistant TB.
NIH	Tuberculosis Research Unit (TBRU)	The TBRU contract (N01-AI-95383, Case Western Reserve University) continues to make progress in developing surrogate markers of disease and human protective immunity and in conducting clinical trials of potential new TB therapeutic, preventive, and diagnostic strategies. Activities of the TBRU are coordinated with other major organizations involved in TB research, including the CDC, USAID, FDA, WHO, Global Alliance for TB Drug Development and IUATLD, and with interested industrial partners.	Information about on-going TBRU supported studies can be found at: http://www.tbresearchunit.org.
NIH	Bacteriology and Mycology Study Group (BAMSG) and Bacteriology and Mycology Biostatistical and Operations Unit (BAMBU)	The BAMSG and BAMBU continue to support clinical trials against fungal and resistant bacterial infections. The BAMSG was awarded to the University of Alabama in 2001. A reserve fund to support orphan studies that cannot be funded through industrial sponsors is available through the BAMSG contract.	Active and Planned Protocols include: BAMSG 3-01 A phase II randomized trial of amphotericin B alone or combined with fluconazole in the treatment of AIDS-associated cryptococcal meningitis" (8 US sites, 5 Thai sites) Enrollment was completed in March 2007; BAMSG 4-01 Strategies to Reduce Transmission of Antimicrobial Resistant Bacteria in Intensive Care Units (STAR*ICU Trial) (20 US sites) study completed; BAMSG 4-02 Randomized, Multi-Center, Comparative Trial of Short-Course Empiric Antibiotic Therapy versus Standard Antibiotic Therapy for Subjects with Pulmonary Infiltrates in the Intensive Care Unit (ICU) (12 US sites) Study terminated; and BAMSG 4-03 Derivation of a Clinical Prediction Rule for Bacterial Pulmonary Infection in Mechanically Ventilated Children (3 US sites)

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Vaccine and Treatment Evaluation Units (VTEUs)	The VTEUs are a network of university research hospitals across the United States that conduct Phase I, II, and III clinical trials to test and evaluate vaccine and therapeutic candidates for infectious diseases. Through these sites, researchers can quickly carry out safety and efficacy studies of promising vaccines in children, adult, and specific high-risk populations. The results of these trials may have a profound effect on public health here and abroad. Through numerous studies at the VTEUs, researchers have tested and advanced vaccines for malaria, tuberculosis, pneumonia, cholera, and whooping cough. In the last 6 years alone, NIAID has supported more than 110 clinical trials through the VTEUs.	The VTEU is sponsoring "Phase I Studies of the Safety and Immunogenicity of Primary and Secondary BCG Vaccination Delivered Intradermally, Orally, and by Combined Routes of Administration in Healthy and Previously Immunologically Naïve Volunteers." Enrollment to begin in summer 2007.
NIH	Prevention of group B streptococcal (GBS) disease contract	NIAID continues to support research on the prevention of GBS disease through a five year multidisciplinary contract awarded late in 2002 to the Channing Laboratory, Brigham and Women's Hospital. This collaborative multidisciplinary effort is focused on clinical studies in selected populations to further understand GBS infection and on studies of the host immune response.	A clinical trial was recently fully enrolled to evaluate the impact of a GBS vaccine on GBS colonization.
NIH, NIAID	Treating Infectious Diseases in a Microbial World: New Classes of Antimicrobials	Workshop organized and convened by the National Academy of Sciences	Workshop held on May, 2005, summary can be found at: http://fermat.nap.edu/catalog/11471.html
NIH, NIAID	Treating Infectious Disease in a Microbial World: Immunomodulation	Workshop organized and convened by the National Academy of Sciences	Workshop held on May, 2005, summary can be found at: http://fermat.nap.edu/catalog/11471.html
VA	VA research update	VA investigators have a rather extensive portfolio in antibiotic resistance research that for fiscal year 2000 identifies twenty-three separate funded proposals in AR. For 2001, there are twenty-nine funded projects related to AR by VA investigators. These funded research grants cover a wide spectrum of AR issues. In addition, these do not include large clinical trials that may have impact on AR such as collaboration with the NIH-funded HIV ACTG's and pharmaceutical corporate-related research that is widespread throughout the VHA. A specific area of emphasis is transmission of resistance among organisms and spread of these organisms from person to person.	Ongoing. In 2001, twenty-eight projects related to bacterial resistance were underway, an increase of over 300% from 1997. Ongoing. In 2002, VA provided an increase in funding for projects related to AR of approximately 62% when compared to 2001. The number of studies receiving VA-funded financing increased by 80% when comparing 2002 to 2001. VA funding for bacterial antimicrobial resistance related research increased by 90.6% when comparing 2003 to 2001. For FY 2004, Medical Service Research funding for antimicrobial resistance decreased by 13.x% compared to the previous year. Overall Research funding within VA fell during this same period. The depth and breadth of research remains varied, despite this decline. Even though the total number of Medical Research Service funded projects was less, the number of individual VA medical centers supporting this research remained unchanged.
VA	VA research update (con't)	Such topics as spread of resistance in nursing homes, the relationship of resistance to staffing levels, and work practices (organization) as they relate to antibiotic resistance are all part of VA investigators' portfolios and are topics unlikely to be studied in the private sector. VA investigators continue to have an extensive and expanding portfolio in antimicrobial resistance research.	Overall Medical Service research funding for projects associated with antimicrobial resistance increased 26% from FY 2005 to FY 2006, with both an increase in the the number of funded projects and the number of sites receiving funding. For FY 2007 the budget for accepted research projects is a 29% increase over the monies spent on directed-antimicrobial research from FY 2006; the depth and breadth of funded projects remains varied.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
** TOP PRIORITY **			
Action Item #76: Identify, Develop, Test, and Evaluate New Rapid Diagnostic Methods for Human and Veterinary Uses with Partners, Including Academia and the Private Sector. Such methods Should Be Accurate, Affordable, and Easily Implemented in Routine Clinical Settings.			
NIH	Biodefense and Emerging Infectious Diseases Research Opportunities	In response to growing concerns about the use of biological agents in acts of terrorism, NIAID has expanded its biodefense research program. The ultimate goal of that expansion is to develop effective diagnostics, vaccines and therapeutics to protect the public in the event of a biological attack or the sudden emergence of select rare or believed to be eradicated diseases.	PA - 04 - 119; recent awards can be found at the following link: http://www.niaid.nih.gov/biodefense/research/2006awards/default.htm
NIH	"Sepsis and CAP: Partnerships for Diagnostics Development"	This initiative was released in August 2004 with a receipt date of December 14, 2004 (RFA-AI-04-043). The purpose of the initiative is to support industry development of broad diagnostic technologies that provide early detection of select major causes of septicemia, bacteremia, candidemia, and community-acquired pneumonia.	Nine projects were funded in 2005. The purpose of the initiative is to support industry development of broad diagnostic technologies that provide early detection of select major causes of septicemia, bacteremia, candidemia, and community-acquired pneumonia.
NIH	Partnerships to Improve Diagnosis and Treatment of Selected Drug-Resistant Healthcare-Associated Infections	This initiative was released in June 6 2006 with a receipt date of November 27, 2006 (RFA-AI-06-036). The purpose of the initiative is to support the development of rapid diagnosis capable of identifying specific bacterial strains and drug resistant phenotypes and treatment for the following healthcare-associated pathogens: Clostridium difficile, Pseudomonas, Acinectobacter, Klebsiella, Serratia, Proteus, Enterobacter and Stenotrophomonas.	Awards will be made in 2007.
NIH	Food and Waterborne Diseases Integrated Research Network (FWDIRN)	NIAID's FWDIRN network includes multidisciplinary research on all food and waterborne pathogens (bacteria, viruses, and protozoa), as well as toxins, to facilitate the development and evaluation of products to rapidly identify, prevent, and treat food and waterborne diseases that threaten public health. The network includes Immunology (IRU), Microbiology (MRU), Zoonoses (ZRU) and Clinical (CRU) Research Units. The Network will be supported by a Coordinating and Biostatistics Center. One of the MRUs will emphasize research aimed at developing and evaluating therapies for botulism.	Several projects utilizing different methodologies, i.e., RT-PCR, ELISA, and antigen microarrays, are underway to develop rapid, sensitive clinical diagnostics. Targeted enteric pathogens include Salmonella, Shigella, Campylobacter, diarrheagenic Esherichia coli, Listeria, caliciviruses, hepatitis A, and Francisella tularensis.
NIH	Partnerships for Vaccines and Diagnostic Development	A Request for Applications (RFA 03-028) entitled "Partnerships for Vaccines and Diagnostic Development" was released on June 9, 2003. This RFA is focused on development of vaccines against GAS, GBS and Helicobacter pylori and point of care diagnostics for GAS and GBS. Cooperative agreements (U01s) will be used to support the research which must include substantive involvement by an industry partner.	In 2004, NIAID awarded 3 Group A Streptococcal and 1 Group B Streptococcal vaccine-related grants, as well as a grant focused on the development of an improved GBS diagnostic. Ongoing.
USDA	New methods for the determination of AR in Campylobacter	Antimicrobial test methodologies for Campylobacter are technically difficult, costly and often difficult to compare to agar dilution which is considered the 'gold standard'. A microbroth dilution assay has been developed which is cost effective, comparable to existing methodologies, easier than the agar dilution, and compatible with current equipment to determine antimicrobial susceptibility in Campylobacter species. This work will be presented to the National Committee for Clinical Laboratory Standards (NCCLS) for adoption as a recommended testing methodology. NCCLS determines the most accurate means of antimicrobial susceptibility testing and disseminates this information worldwide.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Identification of collagenase secreted by *Salmonella typhimurium* DT 104 and the development of a RT-PCR assay for collagenase expression	In a recent study, we identified a collagenase secreted by DT104. The collagenase identification was based on DNA sequence homology to an *E. coli* collagenase. Also, we could reconstitute the cytotoxic phenotype by introducing the collagenase gene into a collagenase(-) strain. This collagenase is expressed and secreted only under certain conditions that seem to be determined by the host. We have developed an RT-PCR assay for collagenase expression, and we will be using this assay to identify other strains that exhibit the cytotoxic phenotype. Collagenase expression appears to only occur in immunosuppressed veal calves.	Completed. NADC, Ames IA
USDA	Antibiotic resistance determinants and the protozoa-mediated upregulation of virulence in Salmonella	For certain multiresistant Salmonella, I.e., those strains possessing the integron structure in S. typhimurium DT 104, virulence is enhanced following growth within protozoa. In DT 104 the integron gene (SO13) and the invasion gene (hilA) have been identified. The relationship between SO13 and hilA is currently under investigation.	Ongoing NADC ARS Ames IA
USDA	Development of a rapid PCR assay for genus and species identification of enterococci	We developed a multiplex PCR procedure in conjunction with a colony PCR method that will identify the genus and the species of 25 Enterococcus strains that have been isolated and classified. Primers specific for the genus have been combined in 7 different reaction mixtures to primers for the different species and from bacterial culture to finish, the entire process requires approximately 3 ½ hours. The procedure is a cost-effective, rapid, and accurate method for identification of enterococci and an application for a patent is currently being pursued.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Factors affecting microbial ecology of pathogen colonization and AR acquisition	An automated ribotyping system is being used at the USDA/ARS FFSRU to identify, characterize and monitor gut bacteria isolated by us and others; information obtained from this use is being maintained in the Gastrointestinal Microflora Ribotype Database (GMRD). Molecular typing methods (e.g. ribotyping, denaturing-gradient gel electrophoresis (DGGE), and DNA sequencing) are being used to distinguish bacterial strains inhabiting the gastrointestinal tract with even greater precision and to determine genetic alterations occurring within these bacteria. This database is being used by scientists worldwide to develop a more thorough understanding of the effects of sub-therapeutic antibiotic administration and other stressors on the ecology of the gut microflora.	Ongoing. Sheffield Food and Feed Safety Research Unit, ARS, College Station, TX.
USDA	Evaluate a microbroth dilution assay for antimicrobial susceptibility testing of Campylobacter	A microbroth dilution assay has been developed which is cost effective, comparable to existing methodologies, easier than the agar dilution, and compatible with current equipment to determine antimicrobial susceptibility in Campylobacter species. This assay provides an alternate means for testing large numbers of Campylobacter for resistance to a panel of antimicrobials. This work will be useful to scientists and clinicians involved in assessing antimicrobial resistance.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
USDA	Develop a PCR assay for detection of mixed cultures in Campylobacter	Testing for antimicrobial resistance typically occurs on bacteria originating from one single colony. It is commonly assumed that this single colony arose from one bacterium. However, recent reports suggest that bacteria may aggregate, making selection of a single bacterium difficult. We developed a PCR assay which identifies mixed populations of Campylobacter. This PCR assay is ideal for applications with high throughput requirements, such as often occurs within our laboratories testing bacteria for resistance to antimicrobials. This work will be useful to scientists and clinicians involved in assessing antimicrobial resistance.	Completed. Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Develop a multiplex PCR method for identifying the most prevalent clinical serotypes of *Salmonella*.	A new typing technique based on genomics is being developed that detects genes specific for *Salmonella* serotypes by multiplex PCR.	Ongoing. This assay can identify the top 31 serotypes isolated which represent 75% of all clinically isolated Salmonella. The technique can be completed in less than five hours, requires no specialized training, no specific anti-sera, and uses inexpensive reagents.Bacterial Epidemiology and Antimicrobial Resistance Research Unit, ARS, Athens, GA.
USDA	Emergence of multiresistant Salmonella choleraesuis	Recently we isolated a multiresistant salmonella choleraesuis possessing the integron structure found in *S. typhimurium* DT 104. Ongoing studies are aimed at determining the pathogenicity and protozoa-mediated alteration in pathogenicity for this swine-adapted serotype. For SG!1-bearing *S. choleraesuis* we are currently assessing invasion after recovery from free living protozoa.	Ongoing NADC ARS Ames IA
Action Item #77: Encourage Basic and Clinical Research in Support of the Development and Appropriate Use of Vaccines in Human and Veterinary Medicine in Partnership with Academia and the Private Sector.			
DoD	Double-blind placebo-controlled clinical effectiveness trial of the 23-valent pneumococcal vaccine	*S. pneumoniae* is a leading cause of morbidity in the U.S., causing an estimated 500,000 cases of pneumonia, 3,000 cases of meningitis, 50,000 cases of bacteremia, and 7,000,000 cases of otitis media annually. Data from 1981 to 1991 suggest that *S. pneumoniae* causes approximately 12% of pneumonia hospitalizations in the military or 9.5 admissions per 100,000 person-years. A 23-valent pneumococcal vaccine is being used at one military basic training facility and at military training facilities. This vaccine provides coverage for 85 - 90% of the serotypes causing bacteremia in the general population, but its clinical benefit needs to be more fully characterized before the impact of its use on the emergence or spread of S. pneumoniae resistance can be determined.	Completed. Enrollment was completed in June 2003, with a total of 152,765 recruits enrolled. Low incidence of pneumonia cases among both vaccine and placebo groups was observed, and a protective effect was not seen. A five-year follow up period of monitoring electronic records for pneumonia in both vaccine and placebo groups has been completed. Analysis is nearing completion, and a manuscript is being prepared.
FDA	Vaccine research	Research in support of the development and appropriate use of vaccines in humans to: 1) prevent viral infections, i.e. influenza, RSV; 2) prevent common bacterial infections i.e. *S. pneumoniae*, non-typable *Haemophilus influenzae*, group B streptococcus, *N. gonorrhoeae, N. meningitidis*.	Twelve ongoing research projects support development of vaccines for the organisms listed 1) Completed study of protective levels of antibody against neonatal type 1a and 3 group B streptococcal infection (funded through interagency agreement with NICHD). 2) Ongoing research regarding correlates of protection against other common types of group B streptococcus. 3) Investigating correlates of protection against infection with *Streptococcus pneumonia*. 4) *N. gonorrhoeae*. Studying immunogenicity and pathogenicity of associated proteins, funded through the FDA Office of Women's Health.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
FDA	Vaccine development	Research in support of the development of vaccines to prevent colonization, infection, and transmission of tuberculosis	Current projects investigate the following vaccine candidates in mouse model of tuberculosis: combination DNA vaccines, multigene DNA constructs, attenuated live vaccines and subunit vaccines. These vaccines are also being tested using prime-boost strategies and post-exposure models. (Kamath AT, et.al., Vaccine 2005; 23(29):3753-3761)
FDA	Multidrug resistant TB	Research: mechanisms of resistance in multidrug resistant tuberculosis.	Identified genetic mechanisms for multiple mechanisms of drug resistance in *M. tuberculosis*. (TangX, et.al., J Microbiol Methods 2005:May 2005, Devito JA, et.al., Antimicrob Agents Chemother 2003, 47(1):188-195)
FDA	Drug therapy	Research: novel targets for drug therapy (to avoid resistance).	Two ongoing projects that examine the mechanisms of development of HIV drug resistance.
NIH	Bacterial Respiratory Pathogen Research Unit (BRPRU)	This project supports bacterial pre-clinical and clinical studies for the diagnosis, prevention, and management of selected human bacterial respiratory pathogens. The contractor is currently pursuing clinical studies to evaluate vaccines for non-typeable Haemophilus influenzae organisms using a human challenge model, as well as vaccines against Group B Streptococci in a phase I trial. Additional studies include the development of candidate vaccines against Pseudomonas and Moraxella.	Ongoing.
NIH	The tuberculosis research materials and vaccine testing contract (Colorado State University)	The contract provides exploratory and preclinical evaluation of promising new TB vaccine candidates in state of the art animal models and as such continues to provide critical resources for the interface between fundamental and applied science.	At the end of FY2006, more than 150 new TB vaccine candidates have been tested under this contract, one of which has recently entered human clinical trials with several others progressing through various stages of preclinical development.
NIH	Partnerships for Vaccines and Diagnostic Development	A Request for Applications (RFA 03-028) entitled “Partnerships for Vaccines and Diagnostic Development” was released on June 9, 2003. This RFA is focused on development of vaccines against GAS, GBS and Helicobacter pylori and point of care diagnostics for GAS and GBS. Cooperative agreements (U01s) will be used to support the research which must include substantive involvement by an industry partner.	In 2004, NIAID awarded three Group A Streptococcal and one Group B Streptococcal vaccine-related grants, as well as a grant focused on the development of an improved GBS diagnostic. Ongoing.
NIH	Vaccine Action Program(VAP)	The INDO-US Vaccine Action Program initiated in 1987 is a bilateral program that focuses on the development of safe and effective vaccines for major communicable diseases of interest to the two countries through joint research and development efforts.	Priorities under VAP include issues such as: acute respiratory illness, group A streptococci, hepatitis, diarrhea caused by Rotavirus, cholera and other infectious agents, leishmaniasis, typhoid, rabies, HIV/AIDS, tuberculosis, malaria, malnutrition and emerging and re-emerging infectious diseases.
NIH	Science Advance: Immunization with Staphylococcus aureus clumping factor B, a major determinant in nasal carriage, reduces nasal colonization in a murine model.	In a recent study, mice immunized systemically or intranasally with a clumping factor B recombinant vaccine showed a lower level of S. aureus colonization than control animals. The hope is with reduced nasal colonization that the risk of infection will be reduced. The use of vaccines is additionally important because of the high incidence of multiple antibiotic resistances in S. aureus, complicating treatment with traditional antibiotics.	Results are published in: Schaffer AC, Solinga RM, Cocchiaro J, Portoles M, Kiser KB Risley A, Randall SM, Valtulina V, Speziale P, Walsh E, Foster T, Lee JC: Immunization with Staphylococcus aureus clumping factor B, a major determinant in nasal carriage, reduces nasal colonization in a murine model. Infect. Immun. 74:2145-53, 2006.
NIH	Phase 1 and 2 Malaria vaccine trial in Mali	NIAID, in collaboration with Walter Reed Army Institute of Research (WRAIR), GlaxoSmithKline Biologicals, U.S. Agency for International Development (USAID), the University of Maryland School of Medicine Center for Vaccine Develoment (Md/CVD), and the University of Bamako, Mali, completed two Phase I trials in Mali of novel candidate vaccines that target the blood-stage of malaria parasites.	Under the initiative International Collaborations in Infectious Disease Research, NIAID, in collaboration with Walter Reed Army Institute of Research (WRAIR), GlaxoSmithKline Biologicals, U.S. Agency for International Development (USAID), the University of Maryland School of Medicine Center for Vaccine Develoment (Md/CVD), and the University of Bamako, Mali, are conducting pediatric Phase 1 and 2 trials in Mali of a candidate vaccine that targets the blood-stage of malaria parasites.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Phase 1 Malaria vaccine trials in USA		NIAID has undertaken two Phase 1 dosage-escalation trials of two novel candidate malaria vaccines at the Vanderbilt University and Baylor College of Medicine.
NIH	Food and Waterborne Diseases Integrated Research Network (FWDIRN)	NIAID's FWDIRN network includes multidisciplinary research on all food and waterborne pathogens (bacteria, viruses, and protozoa), as well as toxins, to facilitate the development and evaluation of products to rapidly identify, prevent, and treat food and waterborne diseases that threaten public health. The network includes Immunology (IRU), Microbiology (MRU), Zoonoses (ZRU) and Clinical (CRU) Research Units. The Network is supported by a Coordinating and Biostatistics Center. One of the MRUs will emphasize research aimed at developing and evaluating therapies for botulism.	On-going and/or planned clinical activities within the FWDIRN include: "Cell-mediated immunity studies from Salmonella typhi vaccine trials", "Sensitivity of TLR4 polymorphisms to Shigella LPS," "Immunogenicity of tularemia live vaccine strain in humans," "Prime-boost study of the immunogenicity of Vi polysaccharide typhoid vaccine after priming by oral Vi+ S. typhi strain," and "Safety of an anti-Shiga toxin type 2 monocolonal antibody."
Action Item #78: Encourage Basic and Clinical Research in Support of Novel Approaches to Preventing or Treating Infections with Resistant Organisms That Occur in Humans and Animals by Partnering with Academia and the Private Sector.			
CDC	TB Trials Consortium (TBTC)	The TBTC is an investigator-driven collaboration involving TB control programs, academic medical researchers, and CDC whose mission is to conduct programmatically relevant clinical research on TB control and prevention. TBTC designs and executes clinical trials of TB treatment and prevention at sites on 4 continents. Trials are designed both to increase the effectiveness of current regimens and to identify new agents. Colllaboration with the commercial sector is common. TBTC trials have identified new regimens, clarified risk factors for development of drug resistance, and assessed regimens used to treat drug resistant TB. Growing collaborations exist with the commercial sector, the not-for-profit private sector (GATB, MSF, TAG) and the public sector (FDA, NIAID).	TBTC is presently in its 10th year of existence as a formal consortium, and its 12th year of trials. Eight major studies and numerous substudies have been undertaken. More information and a list of publications are available at: http://www.cdc.gov/nchstp/tb/tbtc/default.htm. TBTC studies have identified factors favoring development of rifamycin resistance, and are assessing the efficacy of an intermittent regimen for treatment of INH-resistant TB. TBTC will soon begin a pilot study of the treatment of XDR/MDR TB. TBTC is also working with FDA, the TB Alliance, and others to develop improved biomarkers for TB trials and to facilitate the regulatory process around new TB drug development. It has recently undergone extensive peer review.
CDC, NIH, USAID	Global Alliance for TB Drug Development (GATB, or TB Alliance)	The Global Alliance for TB Drug Development is a public/private partnership to stimulate new drug development against tuberculosis. NIAID is involved in this collaboration with private partners, who are contributing to the development of new drugs to shorten the treatment of TB and facilitate its control in the poorest countries. Over 30 organizations are stakeholders in this innovative public-private partnership, including the Bill & Melinda Gates Foundation, CDC, NIAID/NIH, Rockefeller Foundation, USAID, the World Bank, and WHO. For a comprehensive list, see: http://www.tballiance.org	Program staff assisted the GATB in the process of soliciting requests for drug discovery and development proposals from the global research and development community and in the scientific peer review of the received proposals. As part of a broad search for new collaborations and new drug candidates, GATB representatives meet with pharmaceutical companies with compounds or drugs showing promise as new TB drugs. CDC program staff collaborate with GATB in a joint effort to develop moxifloxacin-based regimens for TB treatment. NIAID TB contract resources contributed significantly to the pre-clinical development of a new TB drug candidate, PA-824.
FDA	Guidance document	Guidance document: Biologics Derived from Bioengineered Plants for Use in Humans and Animals	Working group formed; Draft document completed.
NIH	Cooperative Research for the Development of Vaccines, Adjuvants, Therapeutics, Immunotherapeutics & Diagnostics for Biodefense	To support discovery/design and development of vaccines, therapeutics, adjuvants, and diagnostics for biodefense. This program will help translate research from the target identification stage through target validation to early product development.	Recent awards include: "Integrated Antimicrobial Drug Discovery Scheme for Multidrug Resistant Bacteria."

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Anti-Infective Drug Development Contracts are testing new medicines	Research and development contracts are being used to actively test new candidate compounds for efficacy against infectious complications of AIDS in culture and in animals, a critical component in new drug development and approval. The contract resources will allow NIAID: (1) to support investigator-initiated drug discovery; (2) to stimulate private sector sponsorship of new drugs; (3) to perform comparison or confirmatory studies from different sponsors; (4) to provideinformation for selection of anti-mycobacterial drug candidates and for design of clinical studies; and (5) testing new candidate drugs against drug resistant strains of M. tuberculosis.	Awards include "Drug Development for Opportunistic Infections-Mycobacterium avium Complex," "Tuberculosis Drug Screening," and "Animal Model Testing of TB Drugs," among others. These contracts are still active and have evaulated new chemical entities in vitro and in animal models. New indications for antimicrobial chemical classes such as mefloquine and ketolides have been advanced for M. avium.
NIH	Tuberculosis Antimicrobial Acquisition and Coordinating Facility (TAACF)	This contract was established to acquire compounds for screening against virulent Mtb, maintain a computerized chemical database of compound structures, coordinate and distribute compounds for evaluation in vitro and in an animal model, and report data to suppliers. The TAACF has contacted over 3,500 chemists throughout the world seeking candidate anti-TB compounds.	Over 70,000 compounds have been received from academic and private sector investigators, principally in the United States and Europe, with growing involvement of scientists from Africa, Asia, Australia, South America, and other geographic sites. Data generated have led to discoveries of new chemical classes of drugs active against M. tuberculosis, advanced and supported research grants in this area, and identified FDA approved drugs with in vitro inhibition of TB. The facility website is http://www.taacf.org/.
NIH	Submission of compounds for in vitro evaluation	Staff has selected for evaluation more than 10,000 compounds, based on their chemical structure, from the National Cancer Institute (NCI) chemical repository of over 500,000 compounds. Of these compounds, many have shown initial in vitro activity against a wild-type strain, and some have promising in vitro activity against isoniazid (INH)-resistant strains. A large part of this effort is conducted under an interagency agreement with the Health Resources and Services Administration at the National Hansen's Disease Programs Center.	Ongoing. Of note, efficacy evaluations in animal models of TB are being conducted on selected compounds. Novel chemical classes have been identified with in vitro activity against wild-type and drug-resistant strains.
NIH	High-throughput screening contract with Southern Research Institute	This contract provides a high throughput screening capability to develop and implement biochemical, target-specific Mtb drug screening assays and to develop and implement Mtb metabolic stage-specific drug screening assays.	Ongoing. Selected molecular targets are being screened against large chemical libraries to identify new candidate antibiotics as potential additions to the combined regimen for treatment of tuberculosis, particularly to combat multidrug resistant strains. Assays have been developed and run for specific biochemical targets of active and persistant TB: inhA, DHFR, isocitrate lyase, pantothenate C, malate synthase, and Mtb growth inhibition.
NIH	Bacterial Respiratory Pathogen Research Unit (BRPRU)	This project supports bacterial pre-clinical and clinical studies for the diagnosis, prevention, and management of selected human bacterial respiratory pathogens. DMID is partnering with Emergent Europe Limited to conduct a phase I clinical trial for Group B Streptococci at the University of Iowa.	Ongoing.
NIH	Therapeutics Research on AIDS-Associated Opportunistic Infections and Malignancies	The goal of this program is to stimulate iterative preclinical research for novel therapeutic strategies against opportunistic infections (OIs), co-infections, and malignancies in people with HIV/AIDS. The PA is a joint sponsorship with the National Cancer Institute (NCI) and the National Institute of Dental and Craniofacial Research (NIDCR). The AIDS-associated infections emphasized by this PA are Mycobacterium tuberculosis, Pneumocystis carinii, Crypotsporidium parvum, and the microsporidia.	NIAID awarded the following grants in FY 2004 [DAIDS]: "Menaquinone Biosynthesis in M. tuberculosis" and "Design/Syntheses/Studies/Novel Antituberculosis Agents;" all are ongoing. NIAID awarded the following grants in FY 2005 [DAIDS]: "Targeting InhA for anti-TB drug discovery", "Defining moxifloxacin as a first line TB drug", "New drugs for opportunistic infections", "Catalysis of isoniazid action by M tuberculosis KatG", "Identification of desaturase targets", and "Studies of Cryptococcus neoformans associated with AIDS". All are ongoing.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Food and Waterborne Diseases Integrated Research Network (FWDIRN)	NIAID's FWDIRN network includes multidisciplinary research on all food and waterborne pathogens (bacteria, viruses, and protozoa), as well as toxins, to facilitate the development and evaluation of products to rapidly identify, prevent, and treat food and waterborne diseases that threaten public health. The network includes Immunology (IRU), Microbiology (MRU), Zoonoses (ZRU) and Clinical (CRU) Research Units. The Network will be supported by a Coordinating and Biostatistics Center. One of the MRUs will emphasize research aimed at developing and evaluating therapies for botulism.	Basic research to support novel prevention and/or treatment of infections include projects that focus on: i) the development of small animal models that mimic human disease caused by Campylobacter and the life-threatening sequelae to infection by Shiga toxin-producing Escherichia coli, the hemolytic uremic syndrome (HUS); ii) comparison of the efficacy and potential side-effects of several antibiotics in the treatment of Shiga toxin-producing Escherichia coli; and iii) determination of the benefits and possible risk of monoclonal antibody therapy for HUS.
NIH	Pharmacokinetics and Pharmacodynamics of Antimicrobials in Animal Models	This contract, awarded in 2004, provides a resource to determine basic pharmacology and efficacy characteristics of new chemical entities in order to best evaluate candidate compounds as potential new drugs for tuberculosis and other infections. This contract will allow NIAID to provide critical support for investigator-initiated drug discovery, to stimulate private sector sponsorship of new drugs, to perform comparison (or confirmatory) studies from different sponsors, and to provide information for selection of antimicrobial drug candidates for design of clinical studies. This contract will serve as the central facility for evaluation of novel compounds for physical, pharmacokinetic, and pharmacodynamic properties.	Ongoing. Data on new drug combination regimens from this preclinical research contract has informed and guided the development of new protocols for clinical trials (TB Trials Consortium) coordinated by the CDC.
NIH	Challenge Grant: Development and Manufacture of an MDR-TB Tuberculosis vaccine	The goals of this program are to select the most suitable vaccine candidates that are active in animal models of infection with drug senstivive and MDR tuberculosis and to move the candidate which is most likely to provide protection in humans through preclinical development.	Awarded in 2005, ongoing.
NIH	Challenge Grant: Dihydrolipoamide Acyltransferase: Target for Chemotherapy	Dr. Carl Nathan (Weill Medical College of Cornell University) in collaboration with DeCode, Inc. is developing inhibitors to biochemical pathways of M. tuberculosis that are thought to be specifically active during infection in a host. The long term objective of this program is to conduct state of the art drug discovery, merging bioinformatics and laboratory approaches and to move promising drug candidates for TB through preclinical development.	Awarded in 2004; ongoing.
NIH	Grant: DNA gyrase and quinolone resistance in tuberculosis	The goals of this program are to understand how the quinolones act in mycobacteria and to discover ways to protect the compounds from the development of resistance.	Ongoing.
NIH	Grant: Inhaled Large Porous Particles for Treatment of MDR-TB	David Edwards, Harvard University, seeks to develop an aerosol delivery approach to more effectively treat and improve the control over transmission and outbreak of respiratory infectious diseases, specifically tuberculosis (TB) and multi-drug resistant TB (MDR-TB). His hypothesis is that direct, topical delivery of antibiotics to infected lungs results in relatively high local drug concentrations, which can more quickly eradicate active bacterial populations, thus sterilizing the lungs and reducing the duration of infectivity and the duration of chemotherapy necessary to achieve a durable cure in pulmonary tuberculosis relative to parenteral or oral dosing. Preclinical safety studies for capreomycin and Rifampin are being completed.	Awarded in 2004; ongoing with improvements in delivery technology for drugs against MDR-TB.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
NIH	Malaria Grant Activities	NIAID also supported a Phase 1 clinical trial of a chloroquine-analog effective against chloroquine-resistant P. falciparum, as well as investigator-initiated research on preclinical development and evaluation of novel compounds. The Institute is also supporting preclinical and clinical studies of combination therapies for malaria, especially those including artesunate. Eight of the 24 active projects in the Medicines for Malaria Venture portfolio have current or past NIAID support.	Based in part on data provided by NIAID supported studies, the chloroquine analog AQ-13 has been selected by the Medicines for Malaria Venture for further development as part of a combination therapy with other antimalarials. NIAID is also supporting research to examine alternative means to synthesize artemisinin, a key component of artemesinin combination treatment (ACT). In addition, NIAID is supporting longitudinal clinical trials of artemesinin-containing treatments, as well as studies of the clinical and pathophysiological interactions of HIV and malaria, in Uganda. Following the publication of NIAID-supported research documenting the return of chloroquine susceptibility in Malawi, a NIAID-sponsored longitudina clinical trial of three antimalarial combinations is currently underway in Malawi to investigate these findings further.
Focus Area IV: Product Development			
**** TOP PRIORITY ****			
Action Item #79: Create An Interagency AR Product Development Working Group To Identify and Publicize Priority Health Needs in Human and Animal Medicine for New AR Products (e.g., Innovative Drugs, Targeted Spectrum Antibiotics, Point-of-Care Diagnostics, Vaccines and Other Biologics, Anti-Infective Medical Devices, and Disinfectants).			
CDC	Characterization of biofilm formation among *Candida* species bloodstream isolates and evaluation of a novel antifungal drug catheter lock technique to eradicate or prevent catheter-associated *Candida* biofilms	To date, an antifungal lock technique has not been evaluated for Candida biofilms. Furthermore, the risk of inducing drug resistance in Candida cells colonizing the catheter and exposed to low concentrations of antifungal drug in the lock solution must be carefully studied. Recently, two new classes of antifungal agents, lipid-associated amphotericin B (L-AmB) and echinocandins (ECAN), have been shown to have some efficacy against Candida biofilms. Use of these agents in an antifungal lock solution could offer promise as a technique to prevent or reduce catheter-associated Candida BSI and should be analyzed. This project proposes to establish a laboratory model of living Candida biofilms to characterize biofilm formation among Candida spp. bloodstream isolates. An adaptation of the model will be designed to test the efficacy of an antifungal catheter lock technique and the potential to select for drug resistance in Candida cells within a catheter-associated biofilm.	This project was completed completed April 30, 2006. The data collected established the parameters used to grow *Candida* biofilms in a laboratory model of central venous catheter -associated fungal biofilms for the purpose of testing the efficacy of antifungal lock therapy. Results demonstrated that *Candida* biofilms readily formed on CVC tubing under the conditions tested which mimicked in vivo conditions as closely as possible. Results suggested that biofilm cells attached to CVC tubing are susceptible to amphotericin B at concentrations which are effective against non-biofilm (planktonic) cells. Fungal cell viability was reduced by 2 logs (>90%) after 3 hours exposure to amphotericin B. Key outcomes of this work include establishment of laboratory capacity to study *Candida* biofilms and response to antifungal treatment, standard operating protocols to test antifungal drug susceptibility of fungal biofilms, and evidence to support further evaluation of antifungal lock therapy for treatment and prevention of *Candida* biofilms in vi
FDA	Interagency AR product development working group	FDA has chosen to perform these cooperative activities using existing advisory committees with other agency and industry participation.	Initial AC meeting Feb 19-20, 2002. Docket available for additional comment
FDA	Otitis Media Advisory Committee	Discussion of clinical study design for drugs treating acute otitis media (which may impact resistance in the pediatric population)	Meeting held on July 11, 2002. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder02.htm#Anti-Infective
FDA	FDA/PhRMA Co-Sponsored Workshop	Discussion of statistical issues in clinical trials including trials related to resistant pathogens.	Meeting held on November 9, 2002.
FDA	FDA/IDSA/PhRMA Co-Sponsored Public Workshop	Coordinated and hosted a public workshop that brought together top national leaders and scientists from the Infectious Disease Society of America, Pharmaceutical Research and Manufacturers of America, and U.S. academic institutions along with representatives from CDC and NIH to address current topics of interest associated with AR and antimicrobial drug development.	Meeting held on November 19-20, 2002. CDER resistance web site to access workshop transcripts (http://www.fda.gov/cder/drug/antimicrobial/default.htm)
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of issues relating to macrolide-resistant *Streptococcus pneumoniae* (MRSP)	Meeting held on January 24, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of issues relating to AR in *Streptococcus pneumoniae*.	Meeting held on March 4, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective
FDA	Anti-Infective Drugs Advisory Committee (ADAC)	Discussion of a list of Antimicrobial Resistant Pathogens of Public Health Importance to assist stakeholders in the development of antimicrobial drugs related to resistant pathogens.	Meeting held on May 5, 2003. CDER advisory committee transcripts http://www.fda.gov/ohrms/dockets/ac/cder03.htm#Anti-Infective
**** TOP PRIORITY ****			
Action Item #80: Identify Ways (e.g., Financial and/or Other Incentives or Investments) To Promote the Development and/or Appropriate Use of Priority AR Products, such as Novel Compounds and Approaches, for Human And Veterinary Medicine for Which Market Incentives Are Inadequate.			
FDA	New AR products	Identify and publicize priority public health needs for new AR products; identify the kinds of products we would want to see developed.	Preliminary meeting has occurred; working group is forming; future action TBD CDER advisory committee held February 2, 2002.
FDA	Joint efficacy workshop and advisory committee meeting	Identify ways to promote the development and licensure of additional pneumococcal conjugate vaccines. Joint NIAID/CBER Workshop and Vaccines and Related Products Advisory Committee addressed issues regarding measures of efficacy.	Completed February and March 2001. Workshop regarding correlates of protection for use in licensure of additional pneumococcal vaccines held Spring 2002.
FDA	See Action Item #79 (Interagency AR Product Development Working Group)	See Action Item #79 (Interagency AR Product Development Working Group).	See Action Item #79 (Interagency AR Product Development Working Group).
FDA	Maternal immunization	Development of approaches for licensure of vaccines to prevent group B streptococcal infections. CDC, NIH, FDA meeting May 1998 regarding Maternal Immunization and NIAID, NIH Advisory meeting regarding serological assays.	Continued regulatory and research effort to remove barriers to product development under current funding.
FDA	Guidance document	Guidance document: Biologics Derived from Bioengineered Plants for Use in Humans and Animals.	Working group formed; Draft document completed.
FDA	Noval therapeutic approaches using immunoglobulin	Include a humanized monoclonal antibody and a respirator synctial virus human immune globulin indicated for prevention of serious lower respiratory tract diseases (caused by RSV) and sepsis.	Ongoing regulatory review and research.
NIH	Inclusion of some aspects of AR as Biodefence	Study of the spread of antibiotic resistance, mechanizims of resistance and development of stratagies to recover use of existing antibiotics	Ongoing. Example of recent award include: Microbiotix Inc. "Bacterial DNA helicases: Targets for novel antibiotics."
Action Item #81: Consider, in Consultation with Academia and Industry, Whether Government Has a Constructive Role To Play in Discovery of Drugs and Other Products Targeted To Address Areas Where Market Incentives are Limited and Unmet Needs Exist (e.g., Novel Antimicrobial Drugs Targeted To Specific Resistant Organisms).			
FDA, CDC, NIH	Antimicrobial Drug Development Public Workshop (sponsored by FDA, IDSA and ISAP)	Workshop provided information for and gained perspective from advocacy groups, industry and others on various aspects of antimicrobial drug development, including clinical trial design issues.	Workshop held April 15-16, 2004. Discussed the use of pharmacodynamic information in appropriate dose selection in clinical trials of anti-infective agents, and summarized the issues with developing antimicrobial drugs by allowing data from one serious disease to be supportive of data in another less serious disease such that sponsors would only have to perform one trial instead of two in the less serious disease. CDER resistance web site to access workshop transcripts (http://www.fda.gov/cder/drug/antimicrobial/default.htm)
FDA	New AR products	Development of Hyper-Immune Globulins	CBER role is to develop immunization protocols, assays and standards for such products.

AGENCY	PROJECT TITLE	DESCRIPTION	STATUS
Action Item #82: Continue Ongoing Approaches that Streamline the Regulatory Process, Including Clinical Trials and Enhanced Pre-Clinical Studies (e.g., Use of Pharmacokinetics and Pharmacodynamics Data) To Help Bring AR Products (Including Drugs, Vaccines, Diagnostics and Devices) To Market as Efficiently and As Rapidly as Possible, While Still Assuring Their Safety and			
FDA, CDC, NIH	Antimicrobial Drug Development Public Workshop (sponsored by FDA, IDSA and ISAP)	Workshop provided information for and gained perspective from advocacy groups, industry and others on various aspects of antimicrobial drug development, including clinical trial design issues.	Workshop held April 15-16, 2004. Discussed the use of pharmacodynamic information in appropriate dose selection in clinical trials of anti-infective agents, and summarized the issues with developing antimicrobial drugs by allowing data from one serious disease to be supportive of data in another less serious disease such that sponsors would only have to perform one trial instead of two in the less serious disease. CDER resistance web site to access workshop transcripts (http://www.fda.gov/cder/drug/antimicrobial/default.htm)
FDA	Workshop and committee meeting on efficacy	Identify ways to promote the development and licensure of additional pneumococcal conjugate vaccines. Joint NIAID/CBER Workshop and Vaccines and Related Products Advisory Committee addressed issues regarding measures of efficacy.	Completed February and March 2001 Workshop regarding correlates of protection for use in licensure of additional pneumococcal vaccines was held in Spring 2002.
FDA	Meningitis Vaccine Project (MVP)	MVP is a combined WHO Program for Appropriate Technology in Health (PATH) project to develop affordable meningococcal conjugate vaccines for Africa.	Scientific panel met in March 2003. Consortium of public, private, and non-profit organizations, and a philathropic organization (the Gates Foundation) will develop a vaccine that is critically needed in Africa.
FDA	Regulatory requirements – industry and scientific community	Clarify FDA regulatory requirements to both industry and the scientific community.	1)Presented regulatory requirements for tests used in AR initiaties to the Professional IVD Roundtable twice yearly. Discussed obstacles/issues that might exist in technology transfer; 2)CDRH assisted device manufacturers in the most efficient way to get an alternative method for detecting vancomycin resistance in *S. aureus* to market; 3)preliminary stages of esubmission for AST devices to promote a faster more efficient means of presenting data for a 510(k) review process; 4) 4/10/06 FDA published guidance document to ensure the safe & effective use of in vitro diagnostics for detecting novel influenza A; 5) 2/3/06 FDA cleared new assay submitted by CDC for the detecting human infection with H5 Avaian Flu virus; 6) other approvals:10/18/06 MASTALEX-MRSA rapid test for confirming Methicillin Resistant Staph aureus;12/12/06, Smart GBS Dx System rapid DNA test for detecting Group B strep in pregnant womens; 2/14/07 ImmunoCard STAT EHEC rapid test for detecting Shiga toxins 1 & 2 produced by E.coli in stool to aid in the diagnosis of diseases caused by enterohemorrhagic E.coli (EHEC).
FDA	Topical micobicides	CBER/CDER working group on Topical Microbicides.	Working group formed; Draft document completed.
FDA	See Action Item #80 (Maternal Immunization).	See Action Item #80 (Maternal Immunization).	See Action Item #80 (Maternal Immunization).
FDA	See Action Item #80 (Guidance Document).	See Action Item #80 (Guidance Document).	See Action Item #80 (Guidance Document).
FDA	HIV Drug Resistance Genotype Assay Guidance (See Action Item #10)	Revised guidance on HIV Drug Resistance Genotype Assays. Significantly reduces the extent of studies required for clearance.	Publication pending
FDA	See Action Item #30 (Resistant Pathogens List Advisory Committee Meeting)	See Action Item #30 (Resistant Pathogens List Advisory Committee Meeting)	See Action Item #30 (Resistant Pathogens List Advisory Committee Meeting)
Action Item #83: In Consultation with Stakeholders and Expert Consultants, Identify Ways To Promote The Development of New and Alternative Veterinary Treatments and The Improved Use of Existing Therapies That Are Unlikely to Stimulate Resistance to Drugs in Human Medicine.			
Action Item #84: Streamline the Regulatory and Approval Process for Veterinary Antimicrobial Drugs and Related Products That Are Unlikely, Now or in the Future, To Result In Transfer of Antimicrobial Resistance To Humans.			