Maryland Department of Health and Mental Hygiene
Infectious Disease and Environmental Health Administration

Annual Report 2009
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Infectious Disease and Environmental Health Administration Organizational Chart

I. PROGRAM OVERVIEW

Organizational Changes

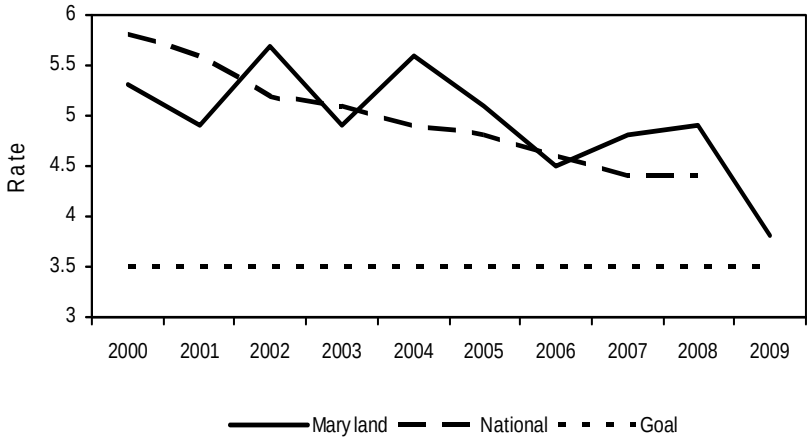
On July 23, 2009, the Maryland AIDS Administration and the Community Health Administration were integrated into the new Infectious Disease and Environmental Health Administration (IDEHA). As part of this broader re-organization, the former Division of Tuberculosis (TB) Control, Refugee and Migrant Health was sub-divided to form the Center for TB Control and Prevention and the Office of Immigrant Health. All staff positions were retained and constitute the current staff of the Center for TB Control and Prevention. The Center was moved as a whole into the Office of Infectious Disease Prevention and Care Services which includes the Center for HIV Prevention, Center for HIV Care Services, Center for Sexually Transmitted Infection Prevention, the Adult Viral Hepatitis Program and Office of Faith Based and Community Partnerships. It is envisaged that this new organizational unit will facilitate even greater collaboration and integration between these programs (See revised IDEHA Organizational Chart attached).

A. Epidemiology of Tuberculosis in Maryland

NOTE: Data are updated as of March 1, 2010.

Incidence. After a three-year period (2006-2008) of increasing incident case counts and case rates in Maryland, substantial declines were noted (Figure 1). In 2009, 219 new cases were reported (inclusive of Baltimore City), a 21% decrease from the previous year's statewide morbidity (278 cases). The 2009 case rate, of 3.8 cases per 100,000 residents, represented a decrease of 22% from the previous year's rate (4.9/100,000). This precipitous decline has been noted across the country and is currently being investigated by CDC.

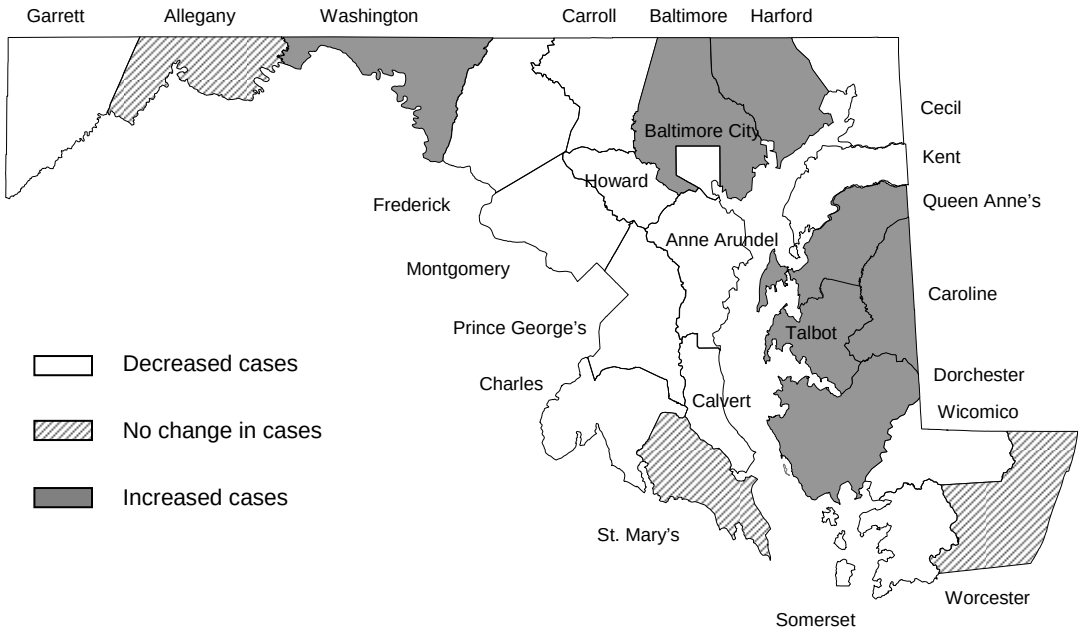
Figure 1. Tuberculosis Case Rates, Maryland, National and the 2000 Interim Goal for Tuberculosis Elimination, 2000-2009.



Location. Baltimore City reported the lowest number of cases in its surveillance history (17 cases in 2009), a 47% decrease from the year before. Cases in the counties also declined by 18% from the year before (202 cases in 2009 vs. 246 cases in 2008). Compared to the year before, 7 jurisdictions reported an increase in cases, 3 reported the same number of cases, and 14

(including Baltimore City) reported fewer cases. When changes in incident cases were mapped, decreases were noted to occur throughout the state (Figure 2).

Figure 2. Change in Tuberculosis Case Counts by County Maryland, From 2008 to 2009



Historically, the immigrant population has been concentrated primarily in Montgomery and Prince George's Counties. As resettlement expands outward from Washington DC, neighboring health departments, which have experienced budget cuts, lay-offs and re-assignment of tuberculosis control staff, continue to treat more new cases than during the previous year.

Origin.

(1) Tuberculosis in foreign-born individuals. The proportion of cases occurring in foreign-born individuals has steadily increased over the past fifteen years, first exceeding 50% in 1999 and exceeding 70% in 2008. Statewide, in 2009, 75% of cases were foreign-born. Twelve of 24 local health departments reported 50-100% of their cases occurred in foreign-born individuals last year.

In 2009, 165 cases in foreign-born individuals, representing 38 countries of origin, were reported. World regions of origin were distributed primarily among South East Asia (35%), Africa (32%) and the Americas (24%). The case rate among foreign-born persons (23.5/100,000) was 21 times the case rate for US-born residents (1.1/100,000) in the state. In 2008 (statewide), the case rate among foreign-born persons was 28.4/100,000, while the case rate for US-born residents was 1.6/100,000.

(2) Tuberculosis in US-born minorities. For 2009, 54 cases in US-born persons were reported. Of those cases, 40 (74%) were non-Hispanic, African American individuals. The majority of African American cases resided in Prince George's County (15 cases, or 100% of US-born cases in that county) and Baltimore City (12 cases, or 86% of US-born cases in the city).

The 2009 case count represents a decline of 49% from a five-year high in 2005 of 79 cases among non-Hispanic, African Americans. The most notable and consistent difference in African American cases has been the level of HIV co-infection. For 4 of the past 5 years, including 2009, 100% of US-born co-infected cases have been African American.

Demographics. Homelessness, as a primary risk factor for tuberculosis, remained at low levels. Three percent (n=6) of 2009 cases were homeless. The majority of these cases were reported from the Maryland counties bordering Washington DC.

Tuberculosis in correctional facilities also remained at low levels, with no new cases reported in inmates and 1% (n=2) of cases reported in employees. Similarly low levels of morbidity were observed in healthcare settings. Three percent (n=6) of cases were reported in residents of long-term care facilities, and 6% (n=14) of cases were reported in health care workers. All of these health care worker cases were foreign-born individuals, with nearly equal percentages of cases among Asians (43%) and Blacks/African Americans (57%). By contrast, for the period 2004-2008, Filipinos (rather than Blacks/African Americans) comprised the largest group of health care workers with reported tuberculosis.

Clinical characteristics. A respiratory site of disease was reported for 74% (n=163) of 2009 cases, representing significant opportunities for transmission. Sputum cultures were obtained for 90% of respiratory cases over the age of 12 years; 84% of these cultures were positive for acid-fast bacilli. Two cases were multi-drug resistant (MDR), both of foreign origin.

B. Tuberculosis Control Activities in Maryland

Several ongoing activities and new tuberculosis control initiatives address the evolving epidemiology of tuberculosis in Maryland.

Location.

- *Regional trainings*. The practice of providing new information and training to local health departments and clinics continues, most recently in the form of 6 trainings on entry of data from the Revised Report of Verified Case of Tuberculosis (RVCT) in the National Electronic Disease Surveillance System (NEDSS). These NEDSS trainings were held throughout 2009 and will be ongoing, in collaboration with the IDEHA's Communicable Disease Surveillance staff who provide NEDSS surveillance training for state and local public health staff.

- *Staff orientation*. Reduced revenues, non-competitive salaries, and the nursing shortage continue to impact local health departments through loss of positions and re-organization. State level clinical consultants continue to spend significant time providing expertise and oversight for new health department tuberculosis control staff. A series of statewide regional

"TB 101" trainings is planned for Spring 2010.

- *Capital Regional TB Council*. Center representatives continue to meet quarterly with representatives from Washington DC and Virginia TB Control programs to discuss regional issues such as interjurisdictional case management, contact investigations, and program evaluation.

Tuberculosis in foreign-born individuals.

- *Evaluation of individuals with Class B waivers*. The number of Class B waiver notifications, received by Maryland, continues to rise. Consequently, additional epidemiologic resources have been devoted to this area. The development of a database, external to the Electronic Disease Notification (EDN) System, was necessary to enable program tracking of evaluation timeliness and follow-up of waivers with no evaluation reported. Reports in this database are being developed to monitor state and county performance for waiver-related National Tuberculosis Indicator Project (NTIP) goals.

- *Contacts to cases on international flights*. In 2009, Maryland received Epi-X notifications of 49 contacts to active TB cases on 21 flights. Local health departments were able to locate 28 (57%) contacts and evaluate all of these contacts. Of those contacts evaluated, 9 (32%) were found to have latent TB infection and 4 began treatment. Since early 2007, when airline contact notifications were first posted to Epi-X, Maryland has located 116 of 186 contacts (62%), evaluated 107 (92%) contacts, identified 30 (28%) contacts with latent TB infection, and provided treatment to 12 (40%) contacts. All follow-up information has been forwarded to the Division of Global Migration and Quarantine (DGMQ).

Tuberculosis in US-born minorities.

- *Program Collaboration and Service Integration*. Continued reorganization due to fiscal constraints and staff relocations has led to the incorporation of the adult viral hepatitis prevention program into the IDEHA Center for HIV Prevention. This Center, the Center for STI Prevention, and the comparable programs from the Baltimore City Health Department continue to hold quarterly collaboration meetings, with the overarching goals of increasing collaborative efforts. A sub-group comprised of STI and HIV staff has formed to focus on data integration.

- *HRSA TB/HCV Integration Project*. Planning for the Mid-Atlantic CHC-FQHC Hepatitis C and TB Colloquium Series in Baltimore City took place at the December 10th and 11th *TB/Hepatitis C Health Disparities Elimination Project* annual meeting hosted by HRSA and CDC in Washington DC. Three half-day educational sessions, targeted at local Baltimore City CHC health care provider staff, are planned for Spring 2010. This project is in Year 2 of a three-year funded project.

Demographics and disease control.

Continued low levels of tuberculosis in institutions and congregate settings are attributed to

several ongoing educational and consultation activities:

- *Infection Control Institute*. TB Control curriculum provided as part of Maryland's biannual three-day training for infection control practitioners in long-term care facilities.

- *Infection control meetings*. Monthly participation at the Correctional Medical Services Infection Control Meeting. A system of monthly conference calls, focusing on TB case management, was initiated in late summer 2008 for all Department of Public Safety and Correctional Services facilities housing inmates with active TB. Since the inception of the program, 4 individuals with TB have been treated within the state corrections system and released to the community without any interruptions in treatment or default.

- *Housing and health care for the homeless*. Ongoing support for local health department programs needing technical and/or financial support to care for homeless clients continues.

- *Refugee resettlement centers*. TB-specific training for refugee outreach and resettlement center staff is provided upon request.

Clinical characteristics and case management.

Historically, 98% of cases have been managed solely by local health departments or co-managed by local health departments and private providers. While current data are unavailable (as this NEDSS field is not populated at the present time), it is assumed that this percentage has not changed significantly. Local health department oversight creates a unique environment to promote optimal tuberculosis treatment, particularly for multi-drug resistant, HIV co-infected, or otherwise complex cases. Support includes:

- *Medical consultation*. Weekly consultation meetings with the State Pulmonologist.

- *Clinical consultation*. Available by telephone 24 hours a day/7 days a week.

- *TB Today*. Maryland's annual three-day intensive training course.

- *Annual Meeting*. Presentation of new treatment guidelines, program initiatives, research findings, epidemiologic updates and program performance measurements.

- *Cohort review*. Attendance of Center staff at a training session, originally planned for April 2010, has been rescheduled for July 2010. Planning for implementation of cohort reviews with county TB program staff continues, with a target start date in mid-2010.

Surveillance and program evaluation.

A considerable amount of resources continue to be directed toward Revised RVCT implementation and NEDSS deployment, which occurred in January 2009.

- *Data entry*. The Center for TB Control and Prevention, in cooperation with General

Communicable Disease Surveillance, provided training for new and experienced NEDSS users in April and May 2009. Local data entry of tuberculosis cases in NEDSS was initiated on July 1, 2009.

- *Data extraction.* Some programming for surveillance reports, performance indicators, and contact investigation evaluation (as well as cooperative agreement applications and progress reports) has been rewritten to accommodate changes to RVCT fields and values and TIMS to NEDSS data exports. However, additional re-programming is needed to reflect NTIP program objectives.

II. PROGRAM MANAGEMENT OBJECTIVES AND PERFORMANCE MEASUREMENTS

NOTE: Data are updated as of March 1, 2010

Objective One: HIV Testing

Definition: The proportion of cases, alive at diagnosis, *regardless of age,* with documented positive, negative, or indeterminate HIV test results.

Goal: 85% percent of eligible cases will receive HIV testing.

Status: Met. 86% of eligible 2009 cases received HIV testing.

Discussion. Maryland treatment guidelines were updated in 2007 to recommend testing for *all* tuberculosis cases, regardless of age or other risk assessment. The updated HIV testing recommendations have been presented in several venues and the level of testing has improved to its highest percentage in 2009 (Table 1). A significant barrier, which could impact future testing levels, should be noted. Foreign-born individuals, particularly those with countries of origin in Asia and Africa, have indicated reluctance to provide parental consent for HIV testing of their teenage children. Various options, for addressing this issue, will be explored with local health departments.

Table 1. HIV Test Status of Tuberculosis Cases by Year.
Cases alive at diagnosis. Baltimore City cases excluded.

Year	Positive	Negative	Refused	Not Offered	Done Results Unknown	Unknown	Total	% Cases Tested	% Tests Positive
2005	24	143	14	32	…	…	213	78%	14%
2006	19	152	24	17	…	…	212	81%	11%
2007	15	157	32	15	…	1	220	78%	9%
2008	28	178	10	26	…	…	242	85%	14%
2009	11	160	12	12	2	1	198	86%	6%

Patient age continues to be the major determinant for HIV testing. Note that 94% of cases 15-34 years of age, and 92% of cases 35-64 years of age received testing (Table 2). By comparison with 2008, a substantial increase in the percentage of cases 65+ years of age receiving HIV testing was observed in 2009 (2009: 72% vs. 2008: 54%).

Table 2. HIV Test Status of Tuberculosis Cases by Age Group, 2009.
Cases alive at diagnosis. Baltimore City cases excluded.

Age In Years	Positive	Negative	Refused	Not Offered	Done Results Unknown	Unknown	Total	% Cases Tested	% Tests Positive
0 - 14	…	4	2	6	…	…	12	33%	0%
15 - 34	2	73	4	1	…	…	80	94%	3%
35 - 64	9	62	4	…	1	1	77	92%	13%
65 +	…	21	2	5	1	…	29	72%	0%
Statewide	11	160	12	12	2	1	198	86%	6%

The Center will continue to reinforce testing for all cases through distribution of county-specific performance reports, presentation of findings at the Annual Meeting, and at regularly scheduled Site Visits.

Co-infection. Six percent of 2009 cases, with testing, were HIV positive, the lowest annual proportion of co-infection reported for Maryland cases over the most recent five-year period (2005-2009) and a 57% decline from the 2008 co-infection rate.

Objective Two: Four-Drug Therapy

Definition: The proportion of cases, alive at diagnosis, with initial drug regimen of isoniazid (I), rifampin (R), pyrazinamide (Z), and ethambutol (E) or streptomycin (S), prescribed and taken for two weeks.

Goal: 90% of eligible cases will receive recommended initial therapy.

Status: Met. 85% of 2009 eligible cases were prescribed IRZE alone.
93% of 2009 eligible cases were prescribed IRZE as well as other medications.

Discussion. Historically, the proportion of Maryland cases initially prescribed IRZE/S has been at or near goal levels; when considered with the use of rifabutin, or other justifiable medication regimens, the goal has been exceeded. In 2009, a slight decrease was noted (2009: 85% vs. 2008: 89%), with a doubling in the proportion of cases initially prescribed other medication regimens (Table 3). Included in the group of cases who were prescribed other regimens were a total of 16 cases who initiated treatment with the standard four-drug (IRZE) regimen in addition to other medications. When combined with the group of cases prescribed IRZE alone, the goal was exceeded, with 93% of 2009 eligible cases having IRZE as a component of their initial treatment regimen; accordingly, the percentage of cases prescribed other combinations of medications dropped to 3%. With the high percentage of foreign-born cases, some TB

physicians are increasingly adding a fluoroquinolone to the initial regimen until such time as sensitivities are obtained.

Table 3. Initial Drug Regimen of Tuberculosis Cases by Year.
Cases alive at diagnosis. Baltimore City cases excluded.

Year	No Drugs	One Drug	IR	IRZ	IRZE/S	% On IRZE/S	Other Comb.	% On Other	Total
2005	3	…	6	5	193	91%	6	3%	213
2006	…	…	…	10	197	93%	5	2%	212
2007	…	…	2	10	197	90%	11	5%	220
2008	1	…	5	7	216	89%	13	5%	242
2009	…	…	2	7	168	85%	21	11%	198

Objective Three: Susceptibility Testing

Definition: The proportion of culture-positive cases with susceptibility test results.

Goal: 95% of eligible cases will have isolates tested for drug sensitivities.

Status: Met. 100% of 2009 eligible cases had isolates tested for drug sensitivities.

Discussion. The majority of cultures and sensitivities are processed, or an aliquot is requested, by the state public health laboratory. Only one "culture-positive" case in the past five years has not been tested for drug sensitivities (Table 4). A MTD (Mycobacterium Tuberculosis Direct) positive test result of an ovarian biopsy had been obtained in India, although the patient was treated here.

Table 4. Susceptibility Testing of Tuberculosis Cases by Year.
Culture-positive cases. Baltimore City cases excluded.

Year	Testing Done	Testing Not Done	Total	% Cases Tested
2005	167	…	167	100%
2006	169	1	170	99%
2007	181	…	181	100%
2008	191	…	191	100%
2009	158	…	158	100%

Resistance. For 2009, monoresistance and multidrug resistance were 9% and 1% of susceptibility test results, respectively. During the prior four-year period (2005 to 2008), monoresistance ranged between 6% and 9%, while multidrug resistance remained at 0-2% of susceptibility test results annually. Two 2009 cases were multidrug resistant.

Genotyping. In the past 5 years, greater than 97% of isolates from culture-positive TB cases were genotyped annually (Table 5). Lost isolates include those that were non-viable or those that

were discarded by private laboratories before they could be requested. In 2009, 9 pending isolates have been requested by our staff from private laboratories. We anticipate that we will receive and submit close to 100% of isolates for the year. Maryland staff have participated actively in the development and testing of the Tuberculosis Genotyping Information Management System (TB GIMS), with its implementation expected in 2010.

Currently, searching for epidemiologic links is done as staff time permits, and it is a passive, rather than an active, process. That is, existing links between patients (links not already identified by local health departments) are often missed. Maryland is a site for the Tuberculosis Epidemiologic Studies Consortium (TBESC) Task Order 26, a project to prioritize clusters and integrate use of genotyping results into local program practice. For this project, we will actively search for epidemiologic links between patients in selected genotypic clusters.

Table 5. Status of *Mycobacterium tuberculosis*-complex isolates genotyping, 2005-2009

Year	Total Culture Positive TB Patients	Total Isolates Lost*	Total Isolates Submitted	Total Isolates Genotyped
2005	219	6	213 (97.2%)	213 (100%)
2006	195	5	190 (97.4%)	190 (100%)
2007	214	5	209 (97.7%)	209 (100%)
2008	218	1	217 (99.5%)	217 (100%)
2009	171	0**	162 (94.7%)	162 (100%)

*Isolate discarded by private laboratory or non-viable
**Isolates requested from private laboratories: none lost as of 2/22/2010

Objective Four: Documented Sputum Culture Conversion in ≤ 60 Days

Definition: The proportion of sputum culture-positive cases, alive at diagnosis and without rifampin resistance, with documented conversion at 60 days from treatment initiation. Conversion interval measured from treatment start date to collection date of first consistently negative culture. Culture is considered negative when collected ≥ 7 days after the last positive culture, and followed by no further positive cultures.

Goal: 75% of eligible cases will have documented conversion in ≤ 60 days.

Status: Met. 71% of 2008 eligible cases had documented conversion at 60 days. *(Exceeds NTIP 2015 target goal)*

Discussion. *For 2008 (as well as for 3 of the past 5 years), Maryland has exceeded the NTIP 2015 target goal of 61.5%* (Table 6). In 2008, 71% of sputum culture-positive cases had documented conversion at 60 days, the highest percentage reported in the past 5 years. Sputum culture conversion was the focus of a multi-year, statewide program evaluation. Many recommendations for process improvements were formally presented at the 2008 Annual Meeting, with re-evaluation and improvement expected by 2011. However, a heightened level of

attention seems to have facilitated improvement earlier than expected. No problems in meeting national target levels of culture conversion within 60 days of treatment initiation are anticipated.

Table 6. Sputum Culture-Positive Cases with Documented Culture Conversion at 60 Days, 90 Days, and Overall by Year. See definition above. Baltimore City cases excluded.

Year	n 60 Days	% 60 Days	n 90 Days	% 90 Days	n Overall	% Overall	Sp. Cult. + Cases
2004	71	62%	94	82%	105	92%	114
2005	66	57%	88	77%	103	90%	115
2006	68	61%	85	77%	100	90%	111
2007	74	67%	93	84%	107	96%	111
2008	89	71%	109	87%	121	96%	126

Objective Five (A): Completion of Therapy in One Year

Definition: The proportion of cases alive at diagnosis, started on any drug regimen, not rifampin resistant, not under age 15 years with bone, joint, meningeal, or miliary disease, and who did not die during treatment, completing treatment within 365 days.

Goal: 90% of eligible cases will complete treatment within 365 days.

Status: In process. 89% of 2008 eligible cases completed treatment within 365 days.

Objective Five (B): Completion of Therapy Overall

Definition: The proportion of cases alive at diagnosis, started on any drug regimen, and who did not die during treatment, completing treatment.

Goal: 95% of eligible cases complete treatment.

Status: In process. 94% of 2008 eligible cases completed treatment.

Discussion. Consistently high rates of Maryland tuberculosis cases complete treatment within one year and complete treatment overall. One-year and overall treatment completion rates for 2008 were just below goal levels (Table 7).

Table 7. Eligible Cases Completing Therapy within 1 Year, and All Cases Completing Therapy by Year. See definitions above. Baltimore City cases excluded.

Year	Therapy of 1 Year or Less Indicated			All Cases		
	Completed	Indicated	% Completed	Completed	Overall	% Completed
2004	208	234	89%	231	237	97%
2005	176	194	91%	191	199	96%
2006	184	202	91%	195	203	96%
2007	176	200	88%	201	209	96%
2008	198	223	89%	213	227	94%

(1) Blank 'Reason Therapy Stopped' fields. No 2008 cases remain open.

(2) Lost, Moved, and Other as Reasons Therapy Stopped. Five 2008 cases were lost, 7 moved overseas, and 2 stopped therapy for other reasons. The names of lost cases are placed on a regional list which is maintained by the Capital Regional TB Council. This list facilitates sharing of relevant information among the neighboring jurisdictions.

(3) Treatment interval greater than one year. Of 223 eligible cases, 198 completed treatment within 365 days. This treatment completion rate (89%) was just below the established goal (90%).

Plan. Reasons for non-completion of treatment within one year and overall are extremely patient-specific. Prolonged treatment intervals are usually justified by severe illness. No intervention is needed, as high rates of treatment supervision and treatment completion are expected to continue in Maryland.

Objective Six: Directly Observed Therapy

Definition: The proportion of tuberculosis cases, alive at diagnosis, and started on any drug regimen, receiving directly observed therapy (DOT).

Goal: 90% of eligible cases will receive DOT.

Status: Met. 94% of 2008 eligible cases received DOT.

Discussion. Rates of DOT remain high, with the 2008 rate of 94% continuing to exceed the 2009 goal (Table 8). The majority of cases not receiving DOT receive a combination of DOT and SAT (self-administered therapy). With the initiation of the Revised RVCT, reporters have been asked to enter comments regarding the reason DOT is not being utilized for a case. However, high levels of treatment supervision are expected to continue. Furthermore, DOT has been established as the standard of care through inclusion in the Code of Maryland Regulations.

Table 8. Tuberculosis Cases by Method of Treatment Administration by Year. See definition above. Baltimore City cases excluded.

Year	Self-Administered	Directly Observed	Both SAT & DOT	TOTAL	% DOT
2004	10	206	33	249	83%
2005	5	185	20	210	88%
2006	3	201	8	212	95%
2007	6	204	10	220	93%
2008	3	227	11	241	94%

Objectives Seven through Ten
Contact Investigation Indices

Eligible: High/medium priority contacts to 2008 sputum smear-positive index cases.
"*Cases*" refer to sputum smear-positive cases and "*contacts*" to high/medium priority contacts in this section.

Objective 7: No Contacts Rate
Goal: ≤ 3% of cases will have no contacts identified.
Status: **Met.** 3% of 2008 cases had no contacts identified.

Objective 8: Evaluation
Goal: 85% of contacts will be evaluated.
Status: **Met.** 87% of contacts to 2008 cases were evaluated.

Objective 9: Treatment Initiation
Goal : 85% of infected contacts will start treatment for latent infection (TLI).
Status: **Unmet.** 78% of infected contacts to 2008 cases started TLI.

Objective 10: Treatment Completion
Goal: 70% of contacts, who start TLI, will complete TLI.
Status: **Met.** 71-72% of contacts to 2005-2007 cases, who started TLI, completed TLI.

Discussion: On August 13, 2009, Maryland 2008 Preliminary and 2007 Final Aggregate Reports for Program Evaluation: Follow-up and Treatment for Contacts to Tuberculosis (ARPEs) were sent to the CDC per submission schedule. At the time of this writing, the 2009 Preliminary and 2008 Final ARPEs are not yet due. Data regarding the evaluation of contacts to 2009 cases, and treatment completion for contacts to 2008 cases, are currently being collected. Therefore, 2008 preliminary data are discussed; 2005-2007 data are presented for discussion of treatment completion (Table 9).

Table 9. Contact Investigation Indices for Maryland Cases by Year.
High/medium-priority contacts to sputum smear-positive cases.
Baltimore City cases excluded.

	Goal	Performance			
	2009	2005	2006	2007	2008
Number of Cases	NA	80	78	71	79
Number of Contacts	NA	1704	1383	877	973
Contacts Per Case	NA	21.3	17.7	12.4	12.3
7. Cases With No Contacts	≤ 3%	3%	1%	1%	3%
8. Evaluation	85%	85%	73%	82%	87%
9. Treatment	85%	71%	82%	72%	78%
10. Completion	70%	71%	71%	72%	NA

Objective 7. No contacts rate. The 2008 no contacts rate was higher than the previous two years, but met the target goal. For two 2008 sputum smear-positive cases, no contacts were identified. One case refused to identify contacts and one case was homeless.

Objective 8. Evaluation. The 2008 evaluation rate exceeded the target goal and was at its highest level over the four-year period (2005-2008). Evaluation of contacts was the focus of the first Maryland Program Evaluation Plan, which concluded that patient-specific factors contributed to low evaluation rates. Chronic staff turn-over and shortages in high-volume clinics are further contributing factors.

Objective 9. Treatment initiation. Although the treatment initiation rate for 2008 was below the target goal, improvement in this performance measure was noted (78% in 2009 vs. 72% in 2008).

Barriers.
(1) Treatment for latent infection is sometimes contraindicated. Maryland collects denominator data on both the number of contacts with latent infection, and the number of those contacts for whom treatment is actually recommended ("candidates"). For contacts to 2008 cases, the difference between the number of individuals with latent infection (227), and the number of treatment candidates (222) was small; 78% of infected individuals and 79% of treatment candidates initiated treatment.

(2) Of note, anecdotal reports indicate a reluctance of foreign-born contacts to initiate treatment when indicated. Foreign-born contacts, with positive TST results, assume that these tests results reflect BCG vaccination in their home countries and, therefore, decline treatment.

Plan. Data regarding country of origin for contacts are not readily available. However, as a majority of reported cases are foreign-born, it is reasonable to assume that a significant number of their contacts are also foreign-born. Therefore, given Barrier (2) (described above), substantial improvement in this measure is questionable.

Objective 10. Treatment completion. Treatment completion rates exceeded the target goal in 2005, 2006 and 2007.

Objective Eleven:
Evaluation of Immigrants with Class B Waivers

Definition: The proportion of immigrants with Class B waivers, for whom the state health department received notification of arrival in 2009 and who are located by local health departments, who are evaluated for tuberculosis conditions.

Goal: 90% of locatable immigrants with Class B waivers will be evaluated.

Status: In process. To date (for 2009), 74% of locatable individuals with waivers have been evaluated.

Table 10: TB Screening with Documented Class B Waiver Status by Year. Baltimore City included.

Outcome	2006	2007	2008	2009
Arrived / LHD Notified	156	211	274	389
Not Located, Refused, Missed Appointment, Moved	NA	29	41	54
Located To Date	137	182	233	335
Disposition Outstanding (Blank)	NA	NA	16	88
Evaluated / Have Diagnosis	121	178	217	247
% of Located Evaluated	88%	98%	93%	74%

Discussion. During 2009, 389 Class B waiver notifications were received at the Maryland Center for TB Control and Prevention and forwarded to local health departments. This is an increase of 42% over 2008 "B waiver" volume. To date, 74% (247/335) of these immigrants, refugees, and asylees have been evaluated (Table 10). Individuals who were not locatable, refused evaluation, did not keep appointments for evaluation, died before evaluation, or moved (n=54) were excluded from this measurement. Local health departments are in the process of evaluating or reporting the disposition of the remaining 88 individuals. Progress towards meeting this goal will continue as these 88 individuals complete evaluation.

Barriers. Locating, scheduling and evaluating individuals with waivers can be a labor-intensive and lengthy process. In many cases, evaluations for individuals who arrived late in 2009 are not completed at this point. There continues to be instances where individuals present at local health departments before the state health department receives notification via the EDN system.

Public health significance. Six Class B waivers with notifications sent in 2009 were diagnosed with active tuberculosis. This accounted for 2.7% of cases in Maryland last year, and follow-up and evaluation is considered a productive source of case finding in the state.

III. HUMAN RESOURCES STRATEGY PLAN 2005-2009

Overview

The Maryland TB Control Program is committed to the ongoing education and training of local health department staff and other providers throughout the 24 jurisdictions of the state, *inclusive* of Baltimore City. Formal trainings are held in conjunction with the Howard Community College, which facilitates administrative issues such as on-line registration, formal evaluation, and granting of CEUs. Cathy Goldsborough continues to serve as the TB-ETN Focal Point for Maryland.

In 2009, 37 separate training events were sponsored by the Center for TB Control and Prevention (hereafter referred to as the Center) or had Center staff on the agenda, with presentations on tuberculosis, refugee and migrant health, and related topics. A total of 839 attended these training events which ranged from brief, focused presentations to multi-day trainings covering a variety of TB prevention and control topics. Some of these trainings are regularly scheduled and occur annually, others were planned to meet current needs and may not be repeated.

Throughout 2009, staff members from the Center, including those working in TBESC, have been invited to present at venues in Maryland and throughout the country in person and by webinar, including Atlanta (CDC), Washington DC (Washington Refugee Resettlement Center), New Jersey (Northeast RTMCC), Texas (Heartland National TB Center), and Florida (Southeastern RTMCC). This speaks to the expertise in content and training skill of staff in this program. Evaluation summaries are available for all events utilizing written evaluation forms.

Due to current fiscal constraints local health departments have placed restrictions on staff travel and time allowed to attend training events. Activities related to H1N1 surveillance and vaccination had some impact on the day-to-day work schedule of local staff assigned to TB control. Some TB nurses needed to be pulled for temporary job reassignments related to the H1N1 vaccination national effort. This placed some limits on the time available for training these employees, but also for those continuing to perform TB control activities.

Although not reported in past years, a record is kept of trainings attended by staff from the Center for TB Control and Prevention and the Office of Immigrant Health. Staff members attended 40 separate events in 2009, with a total of 333 training hours. All trainings were related either to TB control directly, or to the Administration under which TB Control operates. Training logs are kept for both trainings sponsored and trainings attended. Training events sponsored or attended by the Office of Immigrant Health are included in this year's summary, but because of recent organizational changes will not be included in future reports, unless targeted to tuberculosis.

Establish and improve existing in-service TB training and human resource development.

Objective: *At least 160 health care professionals will participate in 8 regional 4-hour Skin Test Training sessions over a 12-month academic year.*

Status: Partially met.

Discussion: In 2009, 136 participants attended 10 sessions of the standard skin test-training program, held at various locations throughout the state. Although attendance is down from 2008, this continues to be a well received program. In 2009, student tuition did not cover all costs related to this training, but when attendance is higher, the nominal fees charged to participants enable the program to be virtually self-sustaining. Costs for this training include fees for instructor time and travel, supplies, and nursing contact hours.

This very successful program has been provided to clinicians statewide for many years, as described in previous Annual Reports. In the past 5 years, a total of 850 students have attended 50 training sessions with the same instructor, and evaluations have consistently indicated the course is well taught, effective, and provides practical application to attendees' job responsibilities. Sessions for the spring of 2010 have been scheduled and information and registration forms are posted on the Center's website. If attendance continues at a reduced rate, the goal for this objective may be lowered in the future.

Objective: *At least 32 Maryland local health department and state facility personnel will participate in the Maryland "TB Today" 3-day training program.*

Status: Partially met.

Discussion: The 22 attendees in 2009 included nurses, nurse supervisors, program directors, and outreach workers from 11 Maryland local health departments, and the TB Control Program in Washington DC. This multi-day program provides in-depth training to new staff in local TB control programs. Speakers include TB experts from Johns Hopkins Bloomberg School of Public Health, Maryland Office of Refugees and Asylees, local TB control programs, and the state Mycobacteriology laboratory, as well as from the state office.

Over the past 5 years, 143 physicians, nurses, administrators, outreach workers, and epidemiologists from Maryland, Washington DC, Pennsylvania, and Delaware TB Control and other programs, including corrections, Andrews Air Force Base, and Fort Meade have completed this annual training. Evaluations consistently highly rate this program which provides an in-depth introduction to TB control, and covers epidemiology, transmission, pathogenesis, laboratory tests, treatment, targeted testing, contact investigations, and case management issues such as working with the foreign born and infection control. Varying teaching modalities are used throughout the training, such as lecture and video format, case review, and small and large group activities.

In 2006, a representative from the Northeast Regional Training and Medical Consultation Center (NRTMCC) attended the program to assist in the evaluation and make recommendations for improvement. The report that followed discussed many positive aspects of the training, such as the range of topics covered, the expertise and ability of the presenters, and the teaching strategies used throughout. In addition, it was determined that this training addressed some of the unmet needs that were identified by Maryland staff during the key informant interview process held by the NRTMCC in 2005.

The 2010 "TB Today" training scheduled for March 30-April 1 has been postponed until 2011, as a direct result of local staff reductions, travel restrictions, and staff assignment to multiple programs. In its place, a one-day training to be held in 3 separate regions of the state, has been planned. This will allow local staff who are new to TB control to gain knowledge of the basics of TB case management without having to travel a great distance or be away for more than one day. It will be recommended that these attendees register for the TB Today program in 2011 as the one-day sessions will provide only the absolute essentials of TB case management, contact investigations, and case reporting.

Objective: *Statewide Regional Meetings will be held in three separate regions in Maryland at least annually.*

Status: Partially met.

Discussion: In lieu of regional meetings in 2009, trainings were held at the computer lab in the state office building for NEDSS data entry. See below.

Regional meetings were held at four sites in winter 2008-2009 to introduce the revised RVCT, with 43 LHD staff attending. Three regional meetings were held in 2008 (42 LHD staff attending), and 3 in 2007 (58 LHD staff attending) when regional meetings were first introduced. Regional meetings are one type of venue preferred by local staff in this era of limited travel time and funding. Future sessions will continue to include a training component that is pertinent.

Objective: *Cooperation and collaboration with the Northeastern Regional Training and Medical Consultation Consortium (NRTMCC) will continue.*

Status: Met.

Discussion: Maryland worked with the NRTMCC and Washington DC and Baltimore City TB Control programs to develop a regional TB intensive workshop. "Advanced TB Training for Clinicians" was held at the Council of Governments building in Washington DC on July 7, 2009. Attendees from TB control programs in Maryland, Baltimore City, and Washington DC participated in this very well-received training. Development of a second session to be held in Wilmington, DE in 2010, is currently in progress.

Cathy Goldsborough serves on the NRTMCC Advisory Council, and participates in regular conference calls for this group. She presented on Program Evaluation at the NRTMCC training for TB program managers on December 15, 2009 which was the first time a web-based format was used for this course. The course will be repeated in the Spring of 2010, and she has been asked again to present on this topic.

Objective: *Representatives (case and program managers) from at least 15 local health jurisdictions routinely reporting TB cases will attend day-long regional training sessions on completion of the Revised RVCT, which is to be implemented January 1, 2009.* Training sessions are scheduled for three November-December dates in three locations to facilitate attendance.

Status: Met.

Discussion: Nearly all Maryland counties have at least one staff person who attended the 1-day training that was developed from the draft CDC RVCT training materials and presented at 4 regional sites over the winter of 2008-2009. Formal evaluations indicated the training was well received and attendees noted all objectives were met. Three state-level staff members attended the CDC training in Atlanta in 2009 for the new RVCT, including one who attended the "train-the-trainer" event. The two state nurse consultants continue to provide direction and assistance to local health departments regarding completion of the new RVCT, so there is no plan to repeat this training in the near future.

The Center has initiated a data quality evaluation project effective February 2010. A graduate student working 20 hours/week will be assessing RVCT data entered into NEDSS as compared to medical record data which will be reviewed at local health departments. The student will be working under the direction of Senior Epidemiologist, Karen Fujii. Discrepancies in NEDSS data reported have also surfaced as a result of year-end cleaning of 2009 data, and are an apparent result of user misunderstanding of certain variable definitions. These issues are being dealt with directly by Surveillance staff.

Objective: *Representatives (data entry personnel) from at least six high-incidence TB Control programs with dedicated TB Control staff will attend training sessions on the use of NEDSS to transmit TB surveillance data to the state and CDC.*

Status: Met.

Discussion: Six separate trainings for data entry into the NEDSS system were held, with a total of 62 attendees from 18 counties, Baltimore City, and state office staff. Because these trainings required access to multiple computers and NEDSS database expert assistance, all sessions were held at the computer lab at the state office and were conducted by the DHMH communicable disease NEDSS database trainer, with assistance from TB Center staff. Some local TB control staff already had experience with the NEDSS database and others had never used this system. Trainings were planned to provide the necessary information to both these groups, with longer sessions available to those who needed more practice with the database during training. Attendees practiced on the demonstration system using data from 2 fictional cases. All received RSA tokens to access the NEDSS system and binders with information including definitions, codes, regional field data, and troubleshooting suggestions.

Evaluations of the training sessions were very positive and attendees indicated they felt they could enter TB data into NEDSS with minimal assistance. A statewide conference call was held after the fourth training to discuss and resolve issues that arose during initial data entry, with 18 counties and Baltimore City participating on the call. Four sessions are planned for 2010, with the possibility of additional sessions if needed. This training will continue to be offered annually.

Additional Training Activities: Statewide conference calls are utilized to discuss key concerns or interests of a more emergent nature, and when information/training is limited in scope.

In 2009, 4 conference calls were held. One call on NEDSS issues is noted above. The other 3 calls included a presentation on TB genotyping and outbreak prediction (6 counties participated), current data from a study on IGRA tests (20 participants), and LHD budget issues and priorities for TB control (9 counties participated).

In 2008, teleconferences were held on the new procedure for ordering TB medications (21 counties participated), and the revised Maryland refugee health assessment form (14 counties and a local service provider participated). In 2007, a conference call on refugee health was held, and in 2006 conference calls were held on ICE detainees and QuantiFERON® testing. Teleconferences will continue to be scheduled as needed.

Other Capacity Building Activities: The following objectives have been added to the Maryland Training and Human Resource Strategy Plan to ensure ongoing consistency in training and evaluation for future state program staff as part of capacity building processes.

1) **Evaluation forms will continue to be utilized at all formal training activities.** Written evaluation forms have been employed at all regional and state training events. Results and recommendations from attendees are always reviewed and considered when planning future trainings.

2) **Local health department staff will have information to enable access to appropriate translators and educational materials for all non-English speaking TB clients.** All local health departments have access to telephone interpreters and many have bilingual staff. The state office continues to assist local staff access to written materials in multiple languages.

3) **New, updated and timely TB information will be presented to Infection Control Practitioners (ICPs) at all acute and long term care settings in Maryland.** A session on "TB Infection Control in Long Term Care" is presented at every Infection Control Institute, a biannual 3-day training for ICPs in long-term care facilities. Pertinent TB Control information and recommendations are disseminated to all acute and long-term care ICPs through the DHMH Division of Infection Prevention and Control.

4) **Collaboration will take place with other state agencies on the implementation and assessment of new name-based HIV reporting in Maryland**. As Maryland moves forward with this process, representation of TB program staff at quarterly meetings with state and Baltimore City STD, HIV/AIDS, and Hepatitis program staff continues. The evolving nature of this group has led to discussion around numerous issues and to a priority focus on information exchange and data sharing between programs. Although the focus of the group remains driven by the HIV/AIDS and STI programs, it is an opportunity to exchange information and educate other programs on issues from both the state and City TB perspective. This goal will be revised to more accurately reflect the degree of collaborative activities engaged in by the TB Center.

5) **The Maryland Department of Public Safety and Correctional Services (DPSCS) will utilize the state TB consultant for all inmates with suspected or confirmed TB disease.** The long-established practice of monthly review by the state pulmonologist with a DPSCS

representative for all suspect and active inmate cases was reviewed and clarified at a meeting with DPSCS, Correctional Medical Services (CMS, the correctional system medical vendor) and Baltimore City representatives in 2008. It was agreed monthly reviews would continue to utilize teleconferencing for CMS medical and IC staff and LHD staff who may not be able to attend in person.

These conjoint monthly reviews were held throughout 2009 regarding three incarcerated TB cases including one with MDR-TB, which improved communication, and assisted all parties to prepare for completion of therapy, which occurred before the end of the year for all 3 inmates.

Monthly reviews will continue to be held for any incarcerated patient with active TB**.** Weekly consult meetings with the state pulmonologist continue to be available to DPSCS and CMS staff and are utilized as needed. A TB control representative attends the monthly Infection Control Meeting held by CMS. The DPSCS Office of Inmate Health Services, CMS, and various programs from DHMH regularly attend these meetings, which always include guest speakers on various disease topics.

6) **Regional meeting forum will be used to discuss collaboration with local detention centers (LDC), including communication and training issues from the LHD perspective.** Communication between LHDs and LDCs continues to be an issue; especially as LDCs house Federal detainees. The Maryland TB Expert Panel met in September and discussed possible venues of collaboration with LDCs, including joint training sessions. This will be explored further with LHDs during the coming year.

7) **Maryland will participate in the Capital Regional TB Council.** This meeting, though not officially sanctioned by the Council of Governments (COG) as it was in the past, is attended by TB control staff from Maryland (local and state office), Washington DC, and Virginia, and other interested parties, such as the American Lung Association. Meetings are held quarterly in the Washington DC office building of the COG which provides administrative support. Attendees share Information on local epidemiology, current issues, and cases who are lost to follow-up. Leadership of this group, which was resurrected in 2005, was passed from Maryland to Virginia in 2008. Most meetings include an educational session by either a regular attendee or invited guest. Those unable to travel to the meeting can participate by conference phone.

8) **Maryland will support CDC training activities.** In 2009, Maryland supported the attendance of one LHD TB staff person to attend the CDC Program Manager's course in Atlanta, GA.

IV. PROGRAM EVALUATION PLAN 2005-2009

The Center for TB Control and Prevention has completed 2 full evaluation projects and is working on a third since this program was initiated in 2005. Center staff have been active at the national level, serving on the Evaluation Work Group (EWG), the TB-Program Evaluation Network (TB-PEN) Steering Committee (including development of the national 5-year strategic plan, national By-Laws, and the first national TB-PEN conference), the TB-PEN Technical Assistance Team, and the National Tuberculosis Indicators Project (NTIP) Intensive Review held in Atlanta in 2007. The results of the first Maryland evaluation were presented in 2007 at the EWG Program Evaluation Roundtable national webinar. Maryland's second evaluation was presented during a break-out session of the TB-PEN conference in July 2009, and a similar presentation was given at the Northeast RTMCC Program Manager's course in December 2009, which will be repeated at the 2010 spring session of this course.

Evaluation Project 1: Evaluation of Contacts to Smear-Positive TB Cases

The first evaluation project was a joint venture with Washington DC and Virginia TB control programs, which started with the formation of a regional Program Evaluation Advisory Group in 2005. This evaluation, an assessment of local resource availability and percent of evaluation of close contacts to pulmonary smear-positive TB cases found that all programs were able to provide the services necessary to identify and evaluate contacts. Some programs were able to offer services directly, such as providing chest radiographs onsite, or by referral to offsite locations, but no best practices related to local use of resources were identified. There was also no apparent difference in the ability to evaluate contacts regardless of whether or not resources were available on site or referrals were made.

After completion of the first evaluation project the Advisory Group discussed the future of regional cooperation for program evaluation, and decided not to continue this effort. Although regional cooperation resulted in a larger data base, a larger pool for identification of best practices, and sharing of the planning and implementation activities, the programs all operate under distinctly different systems, so it was difficult to compare data across programs, and it was very difficult to schedule meetings. But other benefits of this joint project were important and valuable. Meetings of staff across jurisdictional boundaries provided an opportunity to build relationships, and improve cooperation and exchange of ideas, that has continued after the meetings ended. Information about evaluation projects is now shared at the Capital Regional TB Council meetings which are held quarterly at the Council of Governments building in Washington DC, and regularly attended by Maryland, Virginia, and District of Columbia TB Control Programs.

Evaluation Project 2: Evaluation of Culture Conversions within 60 Days from Treatment Initiation

In 2006, Maryland began a second project at the state level which included Maryland and Baltimore City TB control programs. The "Maryland Evaluation Team Action Plan 2007" was submitted to the CDC with Maryland's Interim Report in 2007. The goal of the evaluation was to identify reasons for delayed culture conversion of sputum culture-positive cases, and to

identify best practices to improve rates of conversion within 60 days from treatment start. All cases with delayed culture conversion were reviewed. Findings were analyzed and specific recommendations were developed. A Final Report of the evaluation findings and recommendations was submitted to the CDC with the Annual Report in March 2008.

From recommendations made, several products were developed by the Evaluation Team including standardized procedures for sputum collection, sputum collection reminders, and forms to improve documentation in patient records. A review of the evaluation, a table listing the findings and recommendations, and the new products were presented to all Maryland local health departments and Baltimore City TB Control at regional meetings held in the spring of 2008, and at the state TB meeting in September 2008.

Because recommendations were not in place for an entire year until December 2009, and culture conversion is an indicator that is not available until completion of Follow Up-2 on the RVCT, formal review of the indicator will not be possible until 2011. But this indicator has already shown improvement, and Maryland now exceeds the NTIP goal for culture conversion.

Evaluation Project 3: Completion of Treatment for Latent Infection in Contacts

Prior to the start of the third evaluation project, the Evaluation Team decided to increase membership to help build program evaluation capacity. The Evaluation Team now consists of state level (nurse consultants, epidemiologist, laboratorian and state TB controller) and local (TB nurses from low, moderate and high TB incidence counties) members. Even though the impact of the second evaluation project will not be evident until the surveillance data is complete for 2009 cases, the Evaluation Team met on August 3, 2009 and reviewed the NTIP indicator list to plan for the next Maryland evaluation.

The team selected as its focus the completion of treatment for latent infection in contacts, and developed the plan according to the CDC template. This plan is attached as Appendix A. The team is currently in the process of developing a survey which will collect information from all Maryland local health departments and Baltimore City TB Control regarding practices related to treatment for latent infection of contacts. Data from the survey should be available for analysis this spring, and recommendations will be developed shortly thereafter.

V. TB PUBLIC HEALTH LABORATORY ANNUAL REPORT FOR 2009

(A) In 2009, the Maryland State TB laboratory used NALC-NaOH for specimen processing, MGIT, Bactec™ radiometric 12B liquid media and one Lowenstein Jensen slant for primary isolation, fluorescent acid-fast staining for evaluation of AFB smears, Gen- Probe™ MTD assay for rapid recognition of TB cases and radiometric susceptibility test methods. These methods supported the workload as reported below.

(1)	Number of patients for whom the laboratory confirmed an initial diagnosis of tuberculosis	257
(2)	Number of patient specimens processed and cultured	10,018
(3)	Number of patients for whom cultures were processed or referrals evaluated	4,282
(4)	Number of patients whose specimens produced cultures containing any mycobacteria	777
(5)	Number of patients whose specimens produced cultures containing *M. tuberculosis* (including genotyping isolates)	257
(6)	Number of patients for whom drug susceptibility tests were performed	179
(7)	Number of patients for whom NAAT confirmed the presence of *M. tuberculosis*	90

(B) The goals for our TB laboratory program are accurate and rapid testing to support timely and comprehensive reporting of results. The DHMH Laboratories Administration promotes rapid delivery of specimens by providing courier service from all local health departments in Maryland. The Washington DC TB Program utilizes this courier system through Prince George's County Health Department.

Specimens are processed in early and late morning batches to promote rapid turnaround times for fluorescent acid fast smear results. These results are faxed daily and positive smears are also telephoned to the Center for TB Control and Prevention and the original submitter. Liquid media is one of the primary cultures for every specimen processed. Rapid methods, including Nucleic Acid Amplification Testing, the GenProbe™ accuprobe assays for identification and radiometric and MGIT susceptibility testing are employed to achieve the turnaround time goals established by the CDC. Our work in 2009 specific to these goals is summarized in the following tables:

Table 1. Identification of *M. tuberculosis* complex on initial isolates from clinical specimens within 21 days

Year	Quarter	No. Identified in 21 Days	Total Identified	% Identified in 21 Days
2009	1	31	37	83.7
	2	24	30	80
	3	30	34	88.2
	4	33	39	84.6
TOTAL		118	140	84.3

Table 2. Susceptibility tests for first-line drugs on *M. tuberculosis* complex clinical isolates within 30 days

Year	Quarter	No. Reported in 30 Days	Total Reported	% Reported in 30 Days
2009	1	30	37	81
	2	25	30	83.3
	3	26	34	76.5[1]
	4	24	39	61.5[2]
TOTAL		105	140	75

1. **New method in place (MGIT)**
2. **Holidays/Furloughs/Weekends**

Table 3. Isolates reported as *M .tuberculosis* complex within 7 days of referral to the lab for identification

Year	Quarter	No. Reported in 7 Days	Total Reported	% Reported in 7 Days
2009	1	9	12	75
	2	14	16	87.5
	3	8	9	88.9
	4	13	14	92.9
TOTAL		44	51	86.3

Table 4. First line susceptibility results on M.*tuberculosis* complex referred cultures within 14 days

Year	Quarter	No. Reported in 14 Days	Total Reported	% Reported in 14 Days
2009	1	12	12	100
	2	12	16	75
	3	5	9	55.6[1]
	4	6	14	42.9[2]
TOTAL		35	51	68.6

1. **New method in place (MGIT)**
2. **Holidays/Furloughs/Weekends**

All positive and negative reports are faxed to the submitting clinicians and followed by a mailing. Positive reports are also faxed to local and State TB control personnel. First time reports of *M. tuberculosis* complex are telephoned and faxed. Drug resistance is also telephoned and faxed to the clinician and TB control personnel. Drug resistance was reported on thirty-two (32) patients. The percentage of resistance was 17.9% (32/179). This data includes two (2) cases of multi drug resistance (MDR), a rate of 1.1% (2/179).

(C) The Healthy People 2010 goal of laboratory confirmation of tuberculosis within 48 hours of specimen receipt for 75% of TB cases that are ultimately culture-confirmed has not been met. The laboratory provides courier service to promote rapid delivery of specimens to the laboratory. GenProbe™ MTD tests are utilized to recognize cases as quickly as possible. This test is offered free of charge to hospitals in Maryland who find a new patient specimen to be smear positive or for whom there is high suspicion of tuberculosis. Our laboratory performed 733 MTD tests on 430 patients.

Ninety (90) patients were positive for *M. tuberculosis* complex rRNA. Eighty seven (87) patients were MTD+ and culture positive for *M. tuberculosis*. We isolated TB from the clinical specimens of 148 patients. The number identified by NAA testing (90/148) is 61% of the specimens received for processing by our laboratory. The number identified within 48 hours was 55% (81/148). The total number of TB culture positive cases identified by clinical samples plus referrals is 179. The referred cultures are from hospitals and private commercial laboratories. Based on our laboratories' NAA testing, only 48% of the total cases were identified by this rapid test but the percentage is most likely higher if *M. tuberculosis* NAA tests reports from the private laboratories are included.

The second half of 2009 provided two large barriers to meeting turn around time goals: expanded holidays secondary to government imposed "administrative days" off and furlough days and switching to MGIT as our primary isolation and susceptibility system. The use of MGIT sensitivities posed a particularly difficult problem in regards to dealing with referred isolates, as determining the exact amount of growth necessary to produced acceptable subcultures for sensitivity testing required significant trial and error testing. The following strategies have been adopted in an attempt to overcome these challenges:

For isolation:

- A change in testing algorithms which requires all positive cultures on patients of unknown history be immediately probed for TB complex (as opposed to waiting for the result of an acid-fast smear) unless there is a high suspicion of contamination due to high visual turbidity.
- Delaying start of probes on Friday afternoons to insure all potential cultures of unknown history may be included. This will avoid the weekend delay.

For drug susceptibility testing:

- Improved identification time through the techniques detailed above allows for rapid identification of cultures needing susceptibilities performed.
- Continued practice of setting up susceptibility tests on weekends.

- Use of susceptibility log sheets to monitor that all primary and repeat tests are set up in a timely manner.
- Making a subculture with each susceptibility test to allow for quicker repeat testing.
- Placing all susceptibilities and subcultures for testing in a specialized drawer of the MGIT machine for easy recognition of positives related to sensitivity testing.
- Inoculating subcultures directly and with a 1 to 10 dilution from referred cultures to minimize time necessary for setting up sensitivity testing.

(D) A long-awaited goal was met in 2009. With the support of the IDEHA Center for TB Control and Prevention, the purchase and validation (detection and susceptibility) of two (2) MGIT 960 instruments was completed. Our laboratory continues to provide clinical services to the Washington DC TB Program and support their genotyping and cross-contamination investigations. We continue our partnership with the Tuberculosis Epidemiologic Studies Consortium by performing the QuantiFERON® assay as part of Task Order #18.