Tuberculosis Prevention and Control: Planning North Carolina's Program Evaluation

Elizabeth Szilvay Zeringue

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William Williamson, MPH

Johnnie Page Hubble, BSN, MPH

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Abstract

The Centers for Disease Control and Prevention (CDC) (1999) have identified program evaluation as a priority task for all states calling it “an essential organizational practice” (p.1). Recognizing that tuberculosis elimination is a global health concern, North Carolina’s Tuberculosis Control Program is taking this opportunity to measure progress made toward meeting the national objectives and to plan for future TB control needs. Demographic shifts have increased the state’s foreign born residents, many of whom are from countries with high endemic rates of tuberculosis. Using the CDC Framework for Program Evaluation in Public Health (1999) to develop a five year evaluation plan the program hopes to improve the health of the state’s population by anticipating needs and planning policies and interventions to meet the changing face of tuberculosis in North Carolina.

Elizabeth Szilvay Zeringue

University of North Carolina at Chapel Hill

Public Health Leadership Program

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"The signal challenge of our time is to establish and maintain healthy environments" (Stokols, 1992, p. 6). Program evaluation seeks to measure the effectiveness of public policy, interventions and programs designed to maintain and improve the health of a population. A global health concern, the control of tuberculosis (TB) depends upon political will, allocation of adequate funding, support for research efforts, and vigilance by frontline healthcare staff at county, state, national and international levels.

The interdependent relationships that exist in today's world multiply the challenges faced by TB Control programs (Shortell & Richardson, 1978 and Stokols, 1992). Evaluation takes place in the real world, a dynamic matrix that shifts unpredictably, which can make measuring effects difficult, though not impossible, if flexibility is inherent in the design of the evaluation. Monitoring the effectiveness and efficiency of public health systems is the primary function of program evaluation (CDC, 2001).

Other reasons to perform periodic program evaluation may involve external mandates from funding sources or internal pressures to improve performance (CDC, 2005). The North Carolina Tuberculosis Control Program (the program) has been tasked by the CDC Division of TB Elimination (DTBE) to formally construct and implement a statewide program evaluation plan. “It is vital that each program analyze the circumstances surrounding each new case of tuberculosis in an effort to identify opportunities for intervention that might have prevented the case” (CDC, 1995, p. 15).

The American Public Health Association's Public Health Code of Ethics (2004) emphasizes the moral obligation to share information that can improve the health of populations. Applying program evaluation techniques to the study of tuberculosis control in North Carolina (NC) allows us to build on successes and share these lessons learned with a world community challenged to improve TB control efforts. Sharing these results benefits the global population.
Although treatment of tuberculosis is based on individualized, patient centered plans of care, control efforts focus on the whole process and must encompass the community that surrounds the patient. These efforts include treatment, surveillance and prevention interventions carried out in the affected population which frequently extends beyond the immediate community and can include businesses, prisons or schools, as well as other county, state or country jurisdictions. Results of our evaluation will be used to establish patterns that may provide clues that would enable us to improve such areas as delivery of drugs for treatment of disease or perform contact investigation in a manner both culturally sensitive and efficient.

Where appropriate, I will use one of our program evaluation target populations, pediatrics (children less than 15 years of age), to illustrate how the program identified, prioritized and defined goals for intervention in this population. The CDC provided a template to guide the format of the program evaluations plans. The plan that has been written by this author for submission to the DTBE is included in Appendix A.

Background

North Carolina’s Tuberculosis Control Program arose from the earlier sanatorium movement. In 1906 a committee appointed by the NC Medical Society formed an anti-tuberculosis association. In response to the urgings of these dedicated men, the NC Legislature appropriated $15,000 to purchase land and build the first NC sanatorium for the prevention of tuberculosis. This cadre of healers gave NC a glimpse of the future when they insisted “Prevention is the key...in a point of economy the Legislature should be induced to consider establishing hospitals and care for the treatment of the consumptive poor of the State” (Mrs. P. P. McCain, speech, April 23, 1958).

While prevention was considered key, the word “cure” was not mentioned in 1906. Today, the cornerstone of TB prevention and control efforts hinge on prevention and cure, the three key components of which are

1. Identification and treatment of individuals with tuberculosis disease (cure);
2. Investigation, identification, and treatment of contacts to these cases (contact investigation); and


As total case rates in North Carolina continue to trend downward (www.epi.state.nc.us/epi/tb/data.html) this last component, surveillance and prevention, is fast becoming the primary focus of many local health jurisdictions. To maintain the gains attained in the last 20 years, prevention, as those long ago pioneers in TB Control postulated, must play a major role in the continuing efforts to eliminate tuberculosis.

In 1990 the World Health Organization (WHO) estimated that 1.7 billion persons worldwide were infected with latent tuberculosis. Data from 1997 estimated the annual incidence of new cases of tuberculosis disease to be approximately 8 million (Enarson, Chiang, and Murray, 2004, p. 14). These numbers illustrate not only the scope of public health importance associated with tuberculosis; it places the importance of this disease at the level of a public health emergency. Only through prompt identification, evaluation and treatment can this deadly tide be turned. And while successful programs, such as DOTS (directly observed therapy, short-course) have received widespread support from the global public health community, much remains to be accomplished, both in the United States (US) and abroad before this scourge will be eliminated (CDC, 2001).

Program Evaluation Purpose and Uses

Program evaluation is used in a multitude of ways which may be broadly defined to fit four primary categories.

1. Gain insight – assessing needs or identifying resources and measuring program effects

2. Change practice – enhancing staff's cultural competence or improving the content of educational materials
3. Assess effects – evaluating the distribution of resources and documenting the level of objective achievement

4. Affect participants – may be used to support needed change or to teach new skills (CDC, 1999).

Using our pediatric example, the evaluation plan will address questions regarding the assessment of effect with inquiries such as “Are children under 15 being identified and tested in a timely manner?” and “Are children under 15 completing treatment?” An example of how we might measure this effect is to gather documentation related to the date the suspect was first reported to the health department, the date the health department initiated the contact investigation, the date the pediatric contact was first identified and the date the evaluation was completed and the child started on therapy.

By comparing the length of time between these intervals we get a picture of how the process works in a particular health department. Creating a flow diagram of the process helps to illuminate the issues with a visual display of the activities surrounding the investigation. We are then able to identify barriers to timely care, namely where are delays occurring? Is it in reporting, investigation, evaluation or treatment initiation? What steps need to be implemented to improve the situation? What does the local staff see as working well or needing improvement? Interventions are then constructed to work on only those areas that are problematic rather than change the whole process.

The difficulty related to achieving the final goals in any long term project are discussed in Focus Area 14, Immunization and Infectious Diseases, in the Healthy People 2010 Objectives (www.healthypeople.gov/). Specifically, this involves the decrease in funding that often accompanies success (Federal Register, May 27, 2004). Thus, positive results towards elimination produce a negative effect on funding and resource allocation. There is a need to garner local support for organizational changes necessary to support continued funding of control efforts. This means the state TB program must do a better job of documenting and sharing data with the local entities governing the allocation of financial resources within the county.
Objective assessment of existing interventions and program practices is obtained through the use of the tools wielded in the process of program evaluation (Introduction to Program Evaluation National TB Controllers Workshop June 20 & 21, 2002, Alexandria, Virginia). Evaluation of the program's goals and objectives will occur incrementally over the next five years in accordance with requirements set forth by the CDC DTBE. The first step is the development of a formal plan for that evaluation process. This begins by identifying the needs of each county which vary based on the unique epidemiology and geographic composition of the population. Other factors to be considered include socio-demographics and political climate.

Evaluation of public health surveillance systems is a means to monitor effectiveness of interventions to control significant public health concerns (CDC, 2001, p. 5). Results obtained from the outcome measures will map progress towards attainment of the performance goals as delineated in the Federal Register (May 27, 2004) by the National Center for HIV, STD, and TB Prevention (NCHSTP). The DTBE has declared program evaluation to be a priority (Wilce, 2004). Therefore, the planning and implementation of the program's evaluation will serve to meet these federal mandates.

Prioritizing Need

Pediatric case numbers in NC climbed abruptly after two decades of decline (www.epi.state.nc.us/epi/tb/data.html). Rising 250% pediatric case numbers went from 9 to 32 (Saharia et al., 2003). This increase, detected by the program's nurse consultants during routine analysis of surveillance data, triggered an investigation. The investigation morphed into a retrospective study of pediatric TB in NC and has been submitted for publication.

Using the data collected during the retrospective study, program goals and objectives related to pediatric TB were reviewed and initial priorities assigned by the core TB Control staff. Overlapping areas of concern were identified as first priority for evaluation: pediatric TB rates, and evaluation and treatment of contacts. Both of these areas had been identified by several county TB programs as concerns. The preliminary
data was presented to the NC TB Medical Advisory Committee (TB MAC) who agreed with the recommendation to make these areas the focus of our initial evaluation.

Experts agree the occurrence of pediatric TB represents a sentinel event, that is, it demonstrates recent transmission of TB disease within the community. (Kimerling, et al., 2000; Rigaud & Borkowsky, 2004; Lobeto, Mohle-Boetani & Royce, 2000; Hoskyns, 2002; Nelson, Jereb & Castro, 2004; and Nelson, Schneider, Wells & Moore, 2004)

Although analysis of two decades of trends in tuberculosis identified the pediatric population of NC to be at the lowest risk for development of disease (Salihu, et al., 2001) review of subsequent epidemiological data in NC has identified a disturbing and unanticipated trend beginning in 2002: an increase in the number of pediatric tuberculosis cases. In light of this finding, the program collaborated with Duke University Medical Center to investigate further. Results of the study (Saharia, 2004) were presented, reviewed and discussed at both staff meeting and TB MAC. The conclusion is that there exists a need to improve the ability to rapidly and completely identify and treat LTBI in children less than 15 years of age during the initial phase of the contact investigation to prevent morbidity and mortality associated with progression to disease.

Discussion of the remaining program objectives led to consensus for a five year implementation plan. However, because there are pressures from both internal and external stakeholders influencing priorities, the TB MAC suggested that the timeline remain flexible and that annual review of the objectives for evaluation be undertaken. The program staff acknowledged that program priorities could shift dramatically in the face of changing epidemiology and emerging issues as they did following the identification of increasing pediatric TB rates. The stance of the CDC Program Evaluation Work Group supports maintaining flexibility in the evaluation plan to accommodate acute needs and changing program priorities (Wilce, personal communication, June 28, 2005).

Standards

In order to ensure the evaluation process is fair, established standards of good evaluation practice will be utilized. The Joint Committee on Standards for Educational
Evaluation (1994) and the American Evaluators Association (2004) have established guidelines defining utility, feasibility, propriety and accuracy when used as part of the evaluative process. Standards assist the evaluator in numerous ways including identification of appropriate stakeholders; prudent and efficient performance of duties; definition of ethical boundaries; and systematic collection of valid and reliable data (CDC, 1999 and University of Texas, 2000). The NC TB Control Program is committed to providing the best possible care through the construction of policies and standards that support the optimal health and well being of the population we serve. The American Public Health Association published a code of ethical principles (www.apha.org/codeofethics/) that provide one framework for the ethical practice of public health and will be used to guide the evaluation process. (Appendix B)

Stakeholders

Stakeholders have various levels of influence and interest in program evaluation and may consist of users, supporters or critics (CDC, 1999). Therefore, in order to assure that all needs are considered and resources identified, it is essential to invite key stakeholders to the process. Inclusion of these individuals helps ensure broad representation and encourages input from all parties concerned. Identification and incorporation of key stakeholders in the process of program evaluation enhances the likelihood that meaningful objectives will be created and appropriate measures of success will be utilized. Engaging stakeholders early in the process helps to ensure that buy-in and support from project members and administration will be forthcoming. It is necessary to include input from persons who meet the following criteria:

- Are essential to data collection;
- Utilize the data;
- Are potentially affected by outcomes of the data analysis;
- Provide funding or program oversight; and
- Persons who may be called upon to advocate for, or justify, the program's merit (CDC, 1999).
While time consuming, identification of stakeholders is necessary, serving to create ownership in the program and generate support for ongoing efforts and improvement. During our evaluation process, the program identified community level stakeholders to include the members of the NC TB MAC; county health department staff; nursing director; health director; local board of health; and county commissioners. Any of these persons or groups might be called upon to defend budget requests, justify staffing allocations and resource usage, or explain recommendations or conclusions based on data analysis.

NC TB program staff and the CDC representatives, to whom the program is required to report, were identified as population level stakeholders. Data collected and analyzed at this level are aggregated for state and national reporting. In addition, local feedback is provided to the county TB nurses. These nurses each represent a unique program with specific needs and varying resources. They collect, report, utilize and are directly affected by the results of the data.

A stakeholder group not previously included in discussions is the TB patients. The program staff recognized that this has not occurred to date and lengthy discussion ensued about how to include these persons without compromising patient confidentiality. Should this be accomplished using random selection or include every patient? Would patient satisfaction surveys be adequate or did key informant interviews need to take place? Should it be mandatory or voluntary? Who would conduct the interviews? Who would pay for the supplies and time involved in the process? While these issues were not resolved definitively the discussion raised awareness regarding the need to incorporate input from patients.

Several methods will be employed to obtain input and participation from identified stakeholders including formal and informal interviews; advisory committee meetings; site visits and audits; and written surveys. Because this is the first comprehensive program evaluation it is our plan to assemble a small team of informed stakeholders to serve as a review team. Over the course of the review period a variety of key informant interviews
Program Evaluation

will be performed from a representative sampling of health departments across the state. A program survey tool will be constructed and sent to all 100 county health departments seeking feedback on existing evaluation indices and input concerning any suggested changes or improvements that may be necessary. A written summary will be prepared and sent to the CDC's DTBE and all local health directors to share outcomes and lessons learned.

Program description

The function and responsibility of the program is to assist county TB control programs to prevent, control and eventually eliminate TB in North Carolina. To accomplish this we must strengthen existing collaborative relationships; ensure an adequately trained, competent workforce to carry out the tasks; provide expert consultation and case management to local agency staff; and allocate adequate financial resources to support core TB program activities at the state and county level. The DTBE has identified core prevention and control activities to include completion of therapy, contact investigation, epidemiological surveillance, laboratory services, education and training, and program evaluation.

In addition, the NCHSTP has formulated specific outcome goals by which all state programs will be measured. Therefore, the NC TB Control Program will focus this evaluation process on these stated objectives, gauging our success by these standards. Benchmarks will be established and used for comparison with current and future program outcome measures to identify gaps in service delivery and program performance. These findings will inform short and long-term program planning and policy decisions.

Resources and staffing

The resources and services provided by the program and available to both public and private agencies and individuals across the state include

1. Consultation by telephone or in person is available to every health department and health care provider or agency in the state. This service provides the opportunity to educate persons one on one about the management of
tuberculosis in NC. Provided by the four regional nurse consultants and the state TB Control Medical Director, as necessary, consultation may be a simple as helping a new nurse to fill out case reporting forms or as complex as management of HIV/TB co-infection in a pregnant woman. In addition, the program has the ability to tap the specific expertise of a pediatric infectious diseases physician and to call upon the assistance of regional experts who form the TB MAC. The committee does not make policy. Their purpose is to provide expert opinion and consensus building around policy issues and serve as a sounding board for ideas.

2. Guidance concerning enforcement of federal, state and local communicable disease laws and rules is another service provided by the program. NC has excellent laws covering all aspects of management and treatment of tuberculosis. From isolation and quarantine through incarceration for failure to comply, the state laws detail expected behaviors and allow for prosecution to protect the health of the public.

3. Quality assurance and annual county reviews are performed on site by the regional nurse consultant. To aid in standardization of data collection an internally developed database system was developed by the TB Control Staff. "RVCTplus" (Report of Verified Case of Tuberculosis plus), is a Microsoft Access® based system used by the nurse consultants to collect data during the annual county assessment. Data are collected on individual contacts and linked to their respective source case. This enhances our ability to identify epidemiologic links and monitor treatment and follow up. Aggregate skin testing and LBTI data are also entered into the database. This information is used to complete our annual CDC reporting. Following the assessment findings are written up and discussed with the participants. Copies of the documents are sent to the county health director and placed on file in the main office headquarters in Raleigh. Other agencies may request a review at any time.
4. Education is provided annually for both medical and nursing personnel in a variety of formats throughout the year. The TB Health Educator coordinates the three primary educational offerings open to anyone with an interest in learning about tuberculosis prevention and control. Educational offerings are discussed in detail under Education and Training.

The NC TB Control Program is housed within the General Communicable Disease Control Branch, Epidemiology Section. An organizational chart is located in Appendix C. The TB Medical Director and Program Manager is Carol Dukes Hamilton, MD, an Internal Medicine physician specializing in infectious diseases. The program’s administrator, Joseph Nichols is responsible for grants, contracts and other financial deliverables. The program utilizes four home-based, Regional Nurse Consultants who provide case management, quality assurance, technical assistance and advice, and education within their service areas. (Appendix D) The Health Educator works collaboratively with the Medical Director and Nurse Consultants to identify education and training needs, and design and implement programs statewide. Our current CDC assignee, Jimmy Keller, serves in the capacity of Public Health Advisor (PHA) to the program. Mitzi Kelbaugh serves as the data entry clerk and TB registrar.

Arguably one of the most essential members of the team, the TB registrar, has primary responsibility for data entry into the CDC’s Tuberculosis Information Management System (TIMS), Alien Database, Inter-jurisdictional Referral System, and Pharmaceutical Inventory and Supply System.

1. TIMS is the national electronic reporting system that incorporates North Carolina’s aggregate tuberculosis morbidity data with data from the other US states and territories. Data are entered at the state office and transferred over a secure link to a server at CDC in Atlanta, Georgia.

2. The Alien Database is an in-house tracking system designed by the nurse consultants to capture screening, testing, evaluation, treatment initiation and completion, and disposition of persons immigrating to North Carolina from
outside the United States. We started this database to gain an understanding of
the magnitude of the effect that immigration has had on the rates of tuberculosis
in our state. It is slowly evolving into a way to identify service gaps, identify
foreign language resource needs, assess acceptance rates (Are certain groups
more likely to decline therapy?), and track the development of TB disease in
population subgroups.

3. The Inter-jurisdictional Referral system receives notification of transfer of care of
an active TB patient or of contacts to cases that require continued care in North
Carolina. Usually, these are from other state TB programs. Occasionally, out of
country persons visiting or attending higher education in the US will transfer into
the system. It is important to note that these individuals are never infectious at
the time of travel and pose no threat to the public. However, it is essential to
obtain complete treatment records to ensure continuity of care and to be able to
document both compliance with medication administration, monitoring for side
effects and therapeutic outcomes, as well as treatment completion. This is then
reported back to the referring country. County to county transfer of cases within
NC does not require a formal written report. Communication between the
referring and receiving local TB staff takes place by telephone, secure fax or
email, or conventional post. In the event a transfer does not present at the
identified facility an inter-jurisdictional report is filed so that all counties will be on
the look out for the individual.

4. The Pharmaceutical Inventory and Supply system is a web-based interactive
ordering system that allows the processing assistant to enter drug order requests
from county TB programs directly into an automated system that will ship orders
directly to the health departments. Orders for second line drugs must be
approved through a regional nurse consultant or the TB Medical Director. This is
done to avoid use of non-standard or inadequate drug therapy, a direct cause in
the development of drug resistance.
Objectives

The primary goal of the NC TB Control Program is to eliminate tuberculosis. The evaluation will measure North Carolina's progress towards this goal as defined by each of the objectives listed in the CDC Cooperative Agreements (Federal Register, May 27, 2004). The NC Strategic Plan for TB Elimination (Appendix E) provides decision making guidance to local health agencies throughout the state. Originally crafted in October 1989 in response to publication of the CDC Strategic Plan, it has undergone numerous revisions. The core goal, however, has remained unchanged—eliminate tuberculosis in NC.

In addition to measuring the progress of county and state TB elimination efforts, the evaluation will be used to identify areas for additional education and training. In this way, the NC evaluation plan and the Human Resource Development Plan (HRDP) will complement each other. It is hoped that this collaboration will increase the skills, knowledge and abilities of the county and state field staff and thereby further improve the health of the community and its members.

Initially we experienced some confusion surrounding how to establish benchmarks. I consulted with the several other state TB program representatives and had conversations with persons actively engaged in the evaluation process. "There is no right way to choose a benchmark. However, the selection should be feasible, attainable and logical with the historical context of the program's progress" (Wilce, personal communication, June 13, 2005, 9:30 am EST). We therefore established benchmarks for the objectives using historical program data.

Staging the program

The type of evaluation utilized will depend upon the developmental stage of the program and the external and internal needs of the program users (CDC, 1999 and Community Tool Box: [http://ctb.ku.edu](http://ctb.ku.edu)). The NC TB Control program has been in existence for many years. Although no formal evaluation plan existed, each year data were collected, analyzed and reported to state, local and national entities involved and
interested in the control of tuberculosis. Therefore, the program is defined as being in the last stage of development. Here, the goal of evaluation is to measure the effects of the program on the target population. Evaluation is useful to identify barriers to treatment, improve training and education, decide upon resource allocation and demonstrate accountability (CDC, 1999).

Data sets and standard forms are in the process of being designed and defined for use across programs under the auspices of the National Electronic Disease Surveillance System (NEDSS) work group. Issues of security, access and data sharing are being discussed and protocols formulated to ensure confidentiality in compliance with the Health Insurance Portability and Accountability Act of 1996 (HIPAA). In the interim a database using Microsoft Access® has been created by the TB program staff. Described earlier, RVCTplus is a secure data collection system used to collect and store information during the county’s annual assessment. It houses patient specific and aggregate data necessary to complete CDC reporting requirements. The system interfaces with TIMS and with the state tuberculosis case management system, CaroTims.

Logic Model

A preliminary logic model was created (NC Evaluation Plan, 2005, p. 14) following the template provided by the Evaluation Work Group (CDC, 2005). The purpose of the logic model is to “depict the actions/causes expected to lead to the desired result” (Schmitz & Parsons, nd). The model provides a visual representation of the primary components of the evaluation plan. It is intended to be an overview only, and does not contain the level of detail found in the narrative evaluation plan. The logic model incorporates identified resources and capacity into the plan and may be used to identify gaps and erroneous assumptions about how the system as a whole functions (Community Tool Box: http://ctb.ku.edu).

Methods of Surveillance and Data Collection

Passive Surveillance.
Although most LTBI is identified through employer sponsored skin testing programs, medical office screening, and health department testing, identification of persons with TB disease relies on physician reporting. NC State law, GS 130A-135, requires physicians to report suspected tuberculosis disease within 24 hours to the local health department with a follow up written report due within seven days. Currently there is no mechanism in place to evaluate the effectiveness of this system and a lack of political will to support enforcement. Meanwhile, anecdotal information suggests both under-reporting by physicians and delayed reporting are issues. One California study showed 89% of physicians surveyed failed to report communicable disease (Special Studies Report, 1995).

Considering the lack of available data on the issue of compliance with reporting requirements it may not be feasible to pursue physicians for failing to report. However, some authors caution against complacency suggesting “Clinicians have an important role in interrupting TB transmission” (Mohle-Boetani and Flood, 2002, p. 3). They go on to stress the role of the clinician in triggering rapid contact investigation, decreasing diagnostic delays, and facilitating testing and treatment. Small and Fujiwara (2001) echo this sentiment insisting “...clinicians need to intensify their efforts to identify and treat latent tuberculosis infection. Failure to do so is likely to result in another resurgence of disease and loss of hard-won progress toward the elimination of tuberculosis in the United States.” (p.199)

Active Surveillance.

Aggressive case finding is carried out during contact investigations following reports of suspected disease. There is neither funding nor staffing to conduct routine active field surveillance.

Data Collection.

Data are collected for several purposes:

- Enhance identification, reporting and follow up of TB cases, suspects and contacts;
• Provide the counties with individualized performance feedback;
• Assess the burden of TB disease and infection in North Carolina;
• Provide CDC with required information; and
• Monitor trends and identify transmission related to unrecognized outbreaks.

The nurse consultants perform an annual on-site assessment of each county's cases, contact investigations, targeted testing programs, and persons treated for LTBI. This consists of a review of patient charts and agency policies; interviews with the TB nurse and his or her supervisor; verbal and written feedback to the nurse, supervisor, clinician, and health director; and reporting to the CDC. Data are entered directly into RVCTplus. This system allows data to be queried and reported by individual case, county, region, or state. Information collected in this database is sent to the TB data processing assistant for entry into TIMS. The data populates the annual Aggregate Reports for Tuberculosis Program Evaluation (ARPE).

Case Management

Although each county should have a designated TB nurse who performs the essential functions of TB control and prevention activities, case management is often expected from the state TB nurse consultants. This is largely the case in counties where either turnover has left vacant TB nurse positions or a lack of treatment expertise or complex patient management issues have arisen. While the state program has pushed for education and training for frontline staff, local administration, short on resources, is often reluctant to permit travel or time off work to attend. This generally stems from short staffing circumstances or funding, however, even with funding from grants many of the nurses have difficulty attending training because of multiple clinical responsibilities in addition to TB related duties.

A case in point involves the need to perform contact investigation following notification of a disease suspect. Policy states investigation is to be initiated within 24 hours of notification, with high priority contacts identified and evaluated, including testing
and follow up, when applicable, within seven days. Although some providers and laboratories are diligent about notifying the local health departments about suspect cases, many do not do so in a timely manner. Therefore, it is often several days or weeks before notification delaying initiation of contact investigation. We track the seven day evaluation and testing requirement, but as noted earlier under passive surveillance, no tracking of the 24-hour reporting requirement is done.

_Treatment of Disease and Treatment of Contacts._

Evaluation, treatment and follow up of TB disease are required by North Carolina law (10A NCAC 41A.0205). Services related to the treatment of TB disease are provided at no cost to the individual. State legislature appropriates funding to support the purchase of drugs used in therapeutic regimens. Although individuals with LTBI are not required to take treatment, if they elect to do so, the evaluation, treatment and follow up for LTBI is offered free of charge to residents of North Carolina. This, too, is supported by funding from the state legislature.

_Laboratory Services and Support_

The NC TB program works closely with the NC State Public Health Laboratory (state lab) to ensure that critical components of the program are met. The TB program relies on the rapid, accurate and cost effective results the laboratory produces to identify cases of disease, cross contamination, community transmission and outbreaks. The state lab also has a set of state and national goals and objectives that must be met.

Healthy People 2010 laboratory objectives measure the following recommended turnaround times:

- Delivery of specimens to laboratory within 24 hours of collection
- Perform and report smear results within 24 hours of specimen delivery
- Use of rapid detection methods to determine growth of acid fast organisms between 14-21 days from receipt of specimen
- Determine and report susceptibilities within 21-28 days of receipt of specimen
A second objective discusses the development of an integrated system that ensures timely laboratory testing and flow of information (Kim McCarthy, personal communication, February 3, 2005). TB Control program staff work closely with state lab personnel to facilitate communication between the state and county programs.

The NC state lab and the NC TB program participate in CDC's Universal Genotyping program. The state laboratory spearheads the collection, packaging, and transportation of clinical specimens to the contracted laboratory in Michigan. Results of testing are maintained in a secure database and managed by one of the nurse consultants. Genotyping is used to enhance the identification of unsuspected clusters, outbreaks and unique transmission settings, and to focus contact investigations. It may also be used to eliminate suspects in an investigation of what was thought to be an outbreak. Genotyping proved the cases to be unrelated, background incidence. Genotyping has proven useful during suspected laboratory contamination to identify true tuberculosis from cross-contaminated specimens.

Out of state reporting has been a challenging situation in light of the recent HIPAA legislation and the variation between state communicable disease reporting laws. The program staff has been instrumental in drafting and presenting administrative code to support the requirement for out of state laboratories to report all \textit{M. Tuberculosis} isolates identified to the state lab.

\textit{Training and Education}

The program offers training and education to all medical providers, nurses and other healthcare professionals free of charge. Education and training is supported in part by CDC Cooperative Agreement Funding and by state appropriations. Education opportunities include

- The TB Symposium held in the winter at Duke University School of Medicine. The Symposium is directed towards improving medical management of tuberculosis disease and infection at the clinician level by providing updated information about drugs, vaccines, and the epidemiology of tuberculosis in the
US. This collaborative program is focused on delivering current information on a variety of topics including TB statistical trends in NC, current research, pharmaceutical therapies, diagnostic and management issues, and case studies.

- The Introduction to TB Management course, taught by the Regional Nurse Consultants and TB Medical Director, is held twice a year. A required course for all new local health department TB nurses, this intensive, three-day didactic training begins with the basics of tuberculosis pathogenesis and transmission continuing through the advanced management issues of multi-drug resistant (MDR) TB and HIV co-infection. Participants are from local health departments, military hospitals, prison systems and jails, hospitals and long-term care facilities.

- TB Update takes place every fall. It is used to share information about changes in laws or administrative rules, manual revisions or corrections as well as a time to introduce new policy or program initiatives. In addition, the TB Update reviews policy changes, new research findings, and progress towards the National Objectives for the local health department nurses and physicians.

- The Tuberculosis and Respiratory Diseases Institute is a fee based education seminar that has taken place annually in Black Mountain, NC for the last 55 years. In collaboration with the American Lung Association of NC (ALANC), this two and a half day meeting is a gathering of parties interested in tuberculosis and includes participation by social workers, pharmacists, and health educators in addition to medical and nursing personnel. In this forum, nationally renowned speakers present research, history, practical application, and future trends in tuberculosis treatment and management.

Conclusions

"A recent Institute of Medicine study concluded that we have been given another, perhaps final, chance to control and even eliminate tuberculosis in the United States....capitalizing on this opportunity will require continued attention to the treatment of cases of active tuberculosis, plus an expanded initiative to identify and treat persons
with latent tuberculosis infection" (Small & Fujiwara, 2001). So here we are, almost 100 years into North Carolina's organized effort to control and eliminate tuberculosis, still trying to convince those who hold the purse strings that funding treatment and prevention strategies is the key to controlling tuberculosis. The big question, then, is "Where do we go from here?"

Expanding existing collaborative relationships is one avenue that could be explored. Locally, the program works closely with Duke University and the University of North Carolina at Chapel Hill School of Public Health on research projects investigating genetic susceptibilities related to the development of tuberculosis disease. Nationally, we participate in clinical trials evaluating new anti-tuberculosis drugs, drug combinations, and drug regimens. In addition, the ALANC partners with us to sponsor annual education programs. We need to examine other areas of practice and research that might provide opportunities to work together.

Lobbying, an area off-limits to state government employees, has received only limited attention. In this increasingly sophisticated world where priorities change with each shift in political leadership it has become evident that we need people trained and committed to delivering our TB message. ALANC, with a long, successful history of lobbying the legislature, can provide lobbyists with expertise necessary to generate support for funding of programs designed to combat tuberculosis and other respiratory diseases.

Advocacy and education of a NC state legislator and his or her aide is allowed and encouraged. State government employees must observe strict guidelines governing who may advocate, under what circumstances, and when. There are also topics that are off limits, such as any mention of money or funding. The TB Medical Director has made annual trips to the local legislative office to discuss tuberculosis and provide legislative aides with North Carolina's statistics on tuberculosis. To ensure that TB remains on the state government priority list the frequency of those visits should be increased.
Capacity building in the form of training and education for local and state staff is the focus of the HRDP. A new CDC program requirement, the HRDP has been drafted and submitted to the CDC for approval. In this plan the state TB program seeks ways to build on introductory TB management skills through the delivery of advanced training. This training may be conducted locally or participant attendance at out of state classes may be supported by the state TB program. The new skills are designed to enhance staff competence in areas such as interviewing, contact investigation, and program management. The program has a strong commitment to facilitate and assure staff competence at the local and state level.

As we have noted, shifting demographics result in a variety of county specific needs related to unique epidemiology, socio-demographics, and population composition. The results of the evaluation will be used to identify program strengths and weaknesses; assist state and local governments to develop policies and interventions to close service gaps; guide modification of existing interventions; and support the appropriation and allocation of future resources. We hope to gain improved understanding of how current policies affect end users, develop indicators that more accurately measure progress, and provide feedback that supports development of long-term planning. The primary purpose in evaluating the program is to assess the effectiveness of policies designed to reduce and eliminate the spread of tuberculosis in the community ultimately improving the health of target populations. Using this data to underscore the importance of maintaining funding levels and TB priorities becomes paramount in the fight to eliminate tuberculosis.
References


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