

The National Tuberculosis Curriculum Consortium: a model of multi-disciplinary educational collaboration

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SUMMARY

The National Tuberculosis Curriculum Consortium (NTCC) seeks to instill knowledge, skills, and appropriate attitudes in the management and control of tuberculosis (TB) among students in the health professions. Unlike other organizations that have produced quality educational materials aimed at practicing clinicians, public health workers, and the general public, the NTCC is primarily focused on undergraduate and graduate education. The NTCC includes geographically disparate faculty from schools of medicine, nursing, pharmacy, public health, respiratory therapy, clinical laboratory sciences, and physician assistant who are experts in the areas of TB, curriculum development, and educational computing. Collaboration occurs through meetings, phone conferences and an innovative web portal that provides a work zone used

to develop, organize, and archive products and resources. A critical accomplishment of the Consortium has been the development of core competencies for TB education for graduates in each of the health care disciplines. Those for medical schools are presented in this article. Current NTCC efforts are directed at developing interactive materials for TB education that can be accessed by multi-disciplinary faculty, nationally and abroad. The collaborative effort of the NTCC serves as a model for future endeavors to strengthen curricula, particularly pertaining to health concerns that are best served by multi-disciplinary approaches.

KEY WORDS: tuberculosis; curriculum; competencies; students; health professions

IN RECENT YEARS, the treatment of tuberculosis (TB) and many other specific diseases within the United States has shifted dramatically from in-patient to out-patient settings. Care for these patients has also shifted from experts who provide disease-specific care to generalist physicians (GPs) who care for patients with a variety of conditions, in the context of delivering much broader health services. Provision of health care by non-physician clinicians, particularly those who practice along with physicians, has increased significantly.¹ The number of nursing and allied health program graduates has grown as managed-care systems increase employment of this workforce for cost containment and as legislation permits their greater responsibility and autonomy.^{1,2} In primary care settings, which frequently provide the first opportunity to identify patients with symptoms of diseases such as TB, physician assistants and nurse practitioners often work with GPs in complementary and interdependent roles.³ An increasing number of respiratory therapists are also caring for patients in venues such as skilled nursing facilities and physician offices.⁴ Furthermore, with the proliferation of managed care, pharmacists have been tapped to

provide support services for primary care physicians in addition to providing pharmaceutical care.^{4,5} Despite the shared functions, these varied health care professionals receive significantly different training.³

Although these shifts in delivery settings and workforce composition apply to the care of persons with many diseases, there have been increasing concerns about the education and the competence of health care providers to deal with highly specialized issues that surround the prevention and treatment of TB because of its global significance and transmission potential within the United States. A variety of high quality educational materials on all aspects of TB, targeted to patients and the public, health care professionals, researchers, and educators, have been produced by national and international agencies such as the Centers for Disease Control and Prevention (CDC), the National Institute of Allergy and Infectious Diseases (NIAID), the World Health Organization (WHO), and the International Union Against Tuberculosis and Lung Diseases (The Union); health departments; educational and research institutions; and non-profit organizations such as the American Thoracic Society (ATS).⁶ With the

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wealth of available educational materials on all content areas in TB, it is disconcerting that clinicians still make frequent errors in TB diagnosis and treatment,⁷ indicating a need to more effectively educate prospective and practicing health care workers about TB management and control.⁸

The National Tuberculosis Curriculum Consortium (NTCC) was established in October 2003 under a contract from the National Heart, Lung & Blood Institute (NHLBI) of the National Institutes of Health.* The overarching goal of the Consortium is to instill knowledge, skills, and appropriate attitudes in the management and control of TB among students in their formative years, and to establish a foundation by which complex issues relating to TB can be continually revisited throughout the span of their careers. Led by the University of California, San Diego School of Medicine, the NTCC consists of faculty who are experts in the areas of TB, curriculum development, and educational computing, and who represent health science schools from a broad range of disciplines: medicine, nursing at both the baccalaureate and nurse practitioner levels, pharmacy, public health, respiratory therapy, clinical laboratory sciences, and physician assistant. Unlike the above-cited efforts of other organizations that are aimed primarily at practicing clinicians, public health workers, and the general public, the NTCC is primarily focused on undergraduate and graduate education to ensure a thorough introduction to the knowledge, skills, and attitudes necessary for the management and control of TB before students differentiate into specialty areas. The Consortium includes faculty from 12 medical (10 allopathic and two osteopathic), six nursing (three baccalaureate and three graduate), and three each of physician assistant, respiratory therapy, pharmacy, clinical laboratory sciences, and public health schools. The educational institutions in the Consortium have been selected to achieve a wide geographical distribution with a strong representation from regions with a high incidence of TB. The inclusion of several institutions located in low-incidence areas of the US is designed to allow for the creation of unique education models that will be useful where high-incidence models may not be effective.

DEVELOPMENT OF CORE COMPETENCIES

Collaboration among the members of the NTCC occurs through a combination of face-to-face meetings and frequent phone conferences. The NTCC Web Portal,[†] which is used to develop, organize and archive work products and resources, facilitates communication and interaction among members and committees through project-based and discipline-specific discussion forums.

One of the first collaborative accomplishments of the Consortium has been the development of competencies for TB education. For each discipline, a core set of competencies for the graduates of the represented programs has been identified. To formulate these competencies, TB educational materials developed by a variety of agencies were reviewed for content and intended educational objectives. Examples of such materials include the CDC Tuberculosis Curriculum, materials developed by the NHLBI Tuberculosis Academic Award (TAA) program and the National Tuberculosis Model Centers, and a list of competencies for GPs suggested by the grantees in the TAA program. The NTCC competencies have been organized across cognitive, psychomotor and attitudinal domains congruent with competency frameworks developed by educational oversight bodies, such as the Accreditation Council of Graduate Medical Education and the National Organization of Nurse Practitioner Faculties. In addition, suggested learner objectives for each competency have been developed, which can be adopted by interested schools based on their specific curricular goals and emphasis. The core competencies and suggested learner objectives for schools of medicine include the following:

1 Demonstrate knowledge of the following:

- i Epidemiology of active and latent TB infection (LTBI) and risk factors for acquisition of TB.
- ii Clinical syndromes associated with TB infection and differences in adult, pediatric, and human immunodeficiency virus (HIV) infected populations.
- iii Diagnostic tests for TB and interpretation of test results.
- iv Treatment of TB infection.
- v Public health TB control system.
- vi Available resources for updating knowledge about TB.

Suggested objectives include:

- a Describe the demographic groups within the United States who are at high risk for TB.
- b Identify geographic regions around the world with a particularly high incidence of TB.
- c Describe the natural history of TB infection.
- d Differentiate between the clinical presentation and underlying pathophysiologic mechanisms for the spectrum of clinical disease including primary TB infection, reactivation TB, LTBI, disseminated TB, and extra-pulmonary TB (EPTB).
- e Explain differences in risk, clinical presentation, clinical course, and management for pediatric patients exposed to or infected by TB.
- f Explain differences in risk, clinical presentation, clinical course, and management for the HIV-infected patient and other immunocompromised populations exposed to or infected by TB as compared to other populations.

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- g Describe the indications and the relative advantages and limitations of the following tests in the diagnosis and treatment of TB: TB skin test, tissue biopsies, acid-fast bacilli (AFB) smear and culture, drug susceptibility testing (DST), polymerase chain reaction (PCR) testing of clinical and laboratory specimens, and TB antigen-specific stimulated interferon release assays test.
 - h Describe the typical chest radiographic findings in adult, pediatric and HIV-infected patients with primary and reactivation pulmonary TB (PTB).
 - i Identify those patients with LTBI who are high priority candidates for treatment and the relative contraindications to such therapy.
 - j Identify the first-line agents and currently recommended treatment regimens used in the treatment of TB.
 - k Identify the second-line agents and the usual indications for their use in the treatment of TB and the role of DST in drug selection.
 - l For each of the treatment agents, describe the most commonly encountered toxicities and clinically important medication interactions.
 - m Identify the risks most commonly associated with the development of multidrug-resistant TB and be aware of local experts in management.
 - n Access and critically evaluate current medical information and scientific evidence pertaining to TB.
 - o Describe the role of county and state health departments in TB control.
- 2 Gather accurate and essential information pertinent to the diagnosis and care of patients or populations infected with TB, including medical interviews, physical examination, historical records and results of diagnostic tests, and/or surveillance.

Suggested objectives include:

- i Assess a patient's risk for possible TB exposure by asking relevant historical questions.
 - ii Recognize patient-reported symptoms and signs that suggest a diagnosis of TB and conduct a relevant review of systems to assess the presence of commonly associated symptoms.
 - iii Recognize and describe physical examination findings that suggest a diagnosis of TB.
 - iv Elicit pertinent historical and physical examination data from patients receiving treatment for LTBI or active TB, to monitor efficacy and medication toxicity.
 - v Describe the use of chest X-ray (CXR) and computed tomography (CT) scan studies for PTB and of other radiographic studies (CT, magnetic resonance imaging [MRI]) for EPTB.
 - vi Describe the source and management of diagnostic laboratory studies and DST data.
- 3 Formulate recommendations about diagnostic and

therapeutic options for patients suspected or known to have TB, incorporating knowledge of best practice and patient preferences.

Suggested objectives include:

- i Identify the need for airborne infection isolation precautions to prevent transmission of suspected or identified TB.
 - ii Based on the presenting clinical syndrome, develop an appropriate diagnostic plan for the patient suspected of having TB.
 - iii Propose treatment plan(s) that reflect accurate interpretation of diagnostic studies, incorporation of knowledge of scientific evidence, and respect for patient preferences/concerns.
 - iv Design plans for monitoring efficacy and side effects of treatment in patients with active TB or LTBI, respectively.
- 4 Negotiate and implement patient management plans for patients infected with TB.
- Suggested objectives include:
- i Implement appropriate airborne infection isolation precautions.
 - ii Evaluate the need for directly observed therapy (DOT) in the treatment of patients with TB.
 - iii Negotiate and implement a care plan for the hospitalized patient with active TB.
 - iv Negotiate and implement a care plan for the patient with active TB in the home.
 - v Implement plans for monitoring efficacy and side effects of treatment in patients with active TB or LTBI, respectively.
- 5 Demonstrate interpersonal and communication skills that foster the development of effective relationships with patients and families affected by TB.

Suggested objectives include:

- i Demonstrate effective listening, questioning, non-verbal and narrative skills in communication with patients infected with TB and with their families.
- ii Provide encouragement and incentives to patients who are receiving treatment for LTBI or active TB.
- iii Educate patients and families about issues related to TB, using language that is understandable and reflects cultural awareness.
- iv Identify behavior patterns, cultural beliefs and values, or concurrent psychosocial issues (e.g., substance abuse, mental disorders) that may pose difficulties for adherence to the recommended treatment regimen.
- v Describe and implement strategies for dealing with such barriers.
- vi Acknowledge personal biases that may interfere with establishing optimally effective therapeutic relationships with patients and families who are affected by TB.

- vii Demonstrate skill in using translators to communicate effectively with non-English speaking TB patients.
- 6 Apply knowledge of community and public health resources for prevention and treatment of TB to optimize health care for patients with TB and their families.

Suggested objectives include:

- i Identify resources for low-cost treatment, monitoring and follow-up of patients with TB.
- ii Describe the current reporting requirements for patients identified with TB infection.
- iii Describe the important issues pertaining to TB screening, education, and prevention for employees in health care environments.
- iv Describe the important issues pertaining to TB screening, education, and prevention for specific populations, e.g., prison populations, new immigrants.

CURRENT AND FUTURE DIRECTIONS

Current efforts of the NTCC are directed at the development of new instructional strategies and modules for TB education that can be accessed by multi-disciplinary faculties to enrich their teaching of TB. A needs assessment of the participating NTCC schools indicated that the majority of schools have traditionally employed passive learning strategies (i.e., lectures) for TB instruction, although significant variability in breadth and depth of TB instruction has existed among the schools. The NTCC has focused on developing TB education materials that fit more interactive learning formats, as the paradigm in adult education has been shifting away from behaviorist to constructivist approaches that emphasize learners' active engagement in hands-on problem solving, analysis, interpretation and application.⁹ Educational products have been tailored to meet the needs of different educational levels within the specific health disciplines. Completed products are now available via a 'User' login to the portal.* Because the NTCC participants represent individuals with positions integral to their institutions, the Consortium serves as an ideal test bed in which to implement and evaluate the efficacy of our endeavors. Utilization beyond the Consortium is being tracked for future research endeavors and needs assessments in the area of TB education.

Application of multiple strategies is required for effective dissemination¹⁰ of the work of the Consortium throughout the US. Relationships with a number

of partner organizations whose focus is on certification of professional competence or on continuing education of health practitioners have been developed. These organizations will help to propagate the work of the Consortium to reach faculty, students, in-training professionals, and practicing health care professionals throughout the US. Such collaboration may also impact TB curricula in schools and motivate student mastery of TB topics.

The identification and publication of core competencies for TB education across multiple disciplines has been the first critical step in fulfilling the overarching mission of the NTCC to impact TB education throughout the US. Just as multi-disciplinary approaches have become the paradigm for the provision of much of the disease-specific health care in the US, collaborative efforts such as that of the NTCC can serve as a model for future curricular endeavors, particularly those targeting health issues that are most effectively addressed by employing the knowledge and skills of a variety of health care professionals. Broad-based educational efforts provide an opportunity to potentially effect large scale improvement in the care of patients with such health issues.

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R É S U M É

Le Consortium du Curriculum National de la Tuberculose (NTCC) cherche à instiller la connaissance, les compétences techniques et les attitudes appropriés dans la prise en charge et la lutte contre la tuberculose (TB) chez les étudiants dans les professions de santé. Alors que d'autres organisations qui avaient élaboré des documents didactiques de qualité visaient les praticiens cliniciens, les travailleurs de santé publique et le grand public, le NTCC a concentré essentiellement ses activités sur la formation secondaire universitaire. Le NTCC inclut les facultés géographiquement disparates provenant de l'École de Médecine, d'Infirmières, de Pharmacie, de Santé publique, de Thérapeutes respiratoires, de Sciences de laboratoire clinique et d'Assistants médicaux qui sont expertes dans les domaines de la TB, de l'élaboration du curriculum et de l'évaluation des formations. La collabo-

ration se développe au cours de réunions, de conférences téléphoniques, d'un portail web innovateur qui met à disposition une zone de travail utilisée pour élaborer, organiser et archiver les produits et les ressources. Une réalisation majeure du Consortium a été le développement de compétences-clé pour l'éducation TB à l'intention des diplômés de chacune des disciplines de soins de santé. Ceux concernant les Ecoles de Médecine sont présentés dans cet article. Les efforts actuels du NTCC sont dirigés vers l'élaboration de matériaux interactifs pour l'éducation TB, accessibles à une faculté multidisciplinaire au niveau national ou international. L'effort de collaboration du NTCC sert de modèle pour les tentatives futures de renforcement des curricula particulièrement appliqués aux problèmes de santé abordés au mieux par des actions multidisciplinaires.

R E S U M E N

El *National Tuberculosis Curriculum Consortium* (NTCC) busca difundir conocimientos, capacidades y actitudes adecuadas en el tratamiento y la lucha contra la tuberculosis (TB) a los estudiantes de las profesiones relacionadas con la salud. A diferencia de otras organizaciones que han generado materiales educativos de calidad destinados a los clínicos, trabajadores de salud pública y al público en general, el NTCC centra su interés en la educación de pregrado y posgrado. El consorcio agrupa profesores que representan facultades de medicina, enfermería, farmacia, salud pública, terapia respiratoria, ciencias de laboratorio clínico y de auxiliares médicos con una amplia distribución geográfica, los cuales son expertos en las áreas de la TB, la elaboración de plan de estudios y la informática educativa. La colaboración se establece mediante reuniones, conferencias telefónicas y un innovador portal en internet que ofrece un espacio de

trabajo utilizado en la elaboración, organización y archivo de productos y recursos. Uno de los logros fundamentales del consorcio ha sido la concepción de núcleos de competencias para la educación en TB, dirigidos a los estudiantes de cada una de las disciplinas de atención de salud. En el presente artículo se consideran los núcleos correspondientes a las facultades de medicina. En la actualidad, las actividades del NTCC se concentran en la concepción de materiales interactivos para la educación en TB, que estén al alcance de un profesorado multidisciplinario a escala nacional e internacional. Las actividades conjuntas del NTCC constituyen un modelo para iniciativas futuras que busquen promover el fortalecimiento de los planes de estudio, en particular aquellos implicados en los problemas de salud cuyas soluciones exigen estrategias multidisciplinarias.