



Creation and Expansion of a Multisite Tuberculosis Screening Initiative

Andrew Crawford¹; Sophia Foroushani, MS¹; Alexandra Woodbridge¹; Katherine Carsky¹; Megan Daniele, MS¹; Robert Drury¹; Rebekah Byrne, MD²; Juzar Ali, MD^{3,4}

¹Tulane University School of Medicine, New Orleans, Louisiana, USA

²Department of Family Medicine, Tulane Medical System, New Orleans, Louisiana, USA

³Department of Pulmonary/Critical Care & Allergy/Immunology, Louisiana State University Health, New Orleans, Louisiana, USA

⁴Director, Wetmore Clinic, Louisiana State University, New Orleans, Louisiana, USA

Corresponding Author: Sophia Foroushani; email: sforoushani@tulane.edu

Published: August 10, 2020

Abstract

The Tulane School of Medicine Student-Run Tuberculosis (TB) Program provides TB testing at six sites located in homeless shelters and rehabilitation facilities throughout New Orleans, Louisiana. The program indirectly assists in ensuring housing, as sites require proof of TB testing to maintain residence. The program was created and is operated by medical students. To date, there has not been a comprehensive description of the program's organization, operation, and expansion. The program has the following goals: (1) provide evidence-based screening and testing for TB in high-risk populations; (2) provide connections to higher care when indicated; (3) allow individuals to maintain residence in the facilities served. Student leaders and physician advisors developed program protocols, an evidence-based TB screening questionnaire, and a referral system with a state-run TB clinic. Since January 2017, 6,198 patients have been evaluated for TB and 693 have been referred to higher care. Additionally, the program provides medical students with the opportunity to gain valuable early clinical exposure. Using this model, future program goals include expansion to provide testing at all similar facilities in New Orleans. In addition, this model may be of use to other medical schools and students who aim to develop and implement similar initiatives.

Introduction

Homeless individuals account for 1% of the United States population yet represent 5% of tuberculosis (TB) cases, due in part to close contact in homeless shelters.^{1,2} Healthcare follow-up in these populations can be difficult to attain without on-site options. This is partially attributable to frequent relocation. The World Health Organization (WHO) suggests that screening and referral programs be implemented in homeless shelters.^{1,2} The Louisiana Department of Health (DoH) recommends the following populations be regularly screened for TB: individuals who have had contact with active TB; homeless individuals; individuals with human immunodeficiency virus, diabetes, Hodgkin lymphoma, or silicosis; and

individuals who use injection drugs.³ A tuberculin skin test (TST) is recommended, with an interferon gamma release assay (IGRA) as an alternative.^{3,4,5} The state also recommends that residential facilities implement TB screenings.³ Financially, many facilities are unable to implement on-site testing. In New Orleans, a large subset of those seeking shelter in residential facilities are homeless or in recovery for substance use. Obtaining medical care and keeping records to secure housing can be difficult for these populations.

The Tulane student-run clinic system, which has provided intermittent TB testing initiatives since 2010, was expanded in 2015 to include a TB screening program at three sites.⁶ The program now operates in six sites, providing TB risk

evaluation and testing. Though not the primary aim of the program, vaccination initiatives for influenza and hepatitis A and B have been added as the program expanded (Figure 1). These initiatives were developed through relationships with local institutions and charitable foundations, but they operate largely separately from the TB program. The program operates under the following aims: (1) provide evidence-based screening and testing for TB in high-risk populations; (2) provide connections to higher care when indicated; (3); allow individuals to maintain residence in the facilities served.

All facilities in which the program operates require proof of TB testing, no older than six months. As such, the services provided by the Tulane TB Program are vital to securing housing for these populations.

Designing, funding, and expanding such a program presents challenges and requires cooperation from program leadership, physicians, community workers, and the local government, as TB is a reportable disease.^{4,5} This descriptive report aims to share program design and expansion processes in order to provide a template for the implementation of similar programs at other institutions (Figure 1).

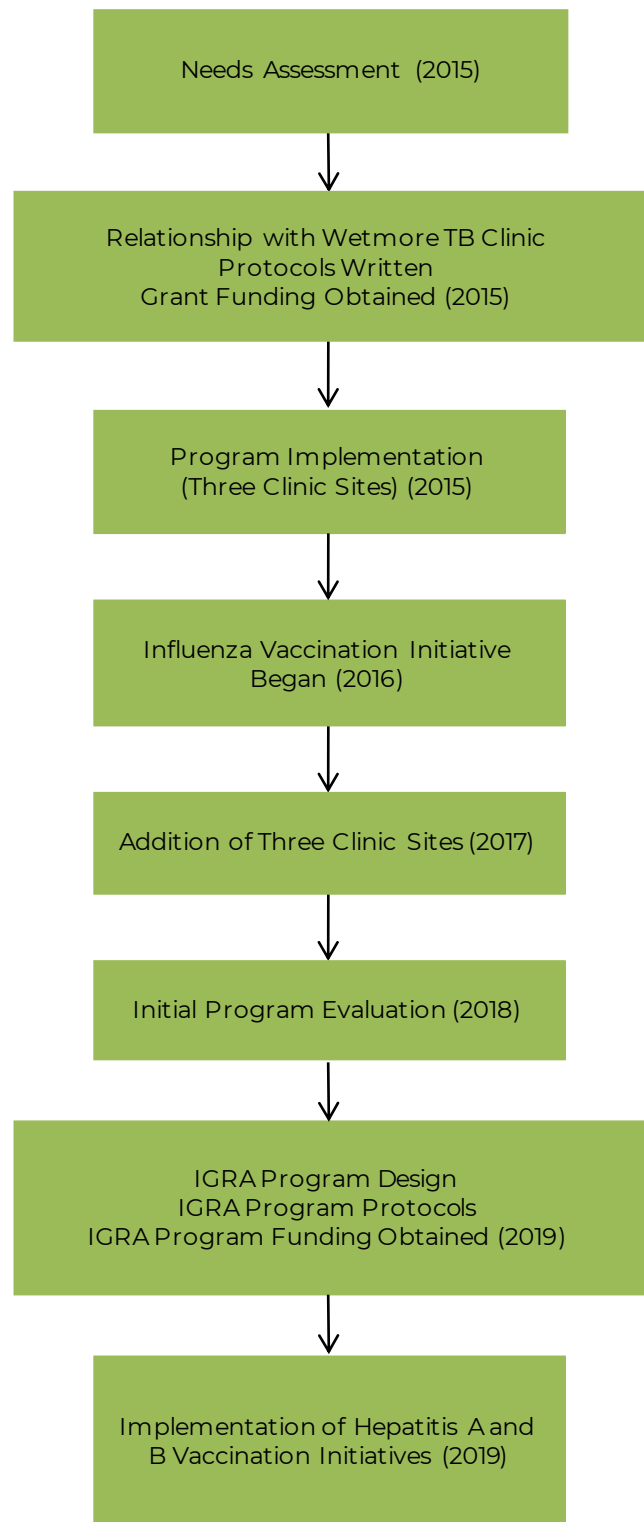
Clinic Overview

Founded in 2015, the program initially consisted of TB testing at two homeless shelters and one rehabilitation center. Since then, two shelters and an additional rehabilitation center have been added. Data regarding program setup was obtained from previous and current iterations of program protocols, dating back to January 2017.

Leadership

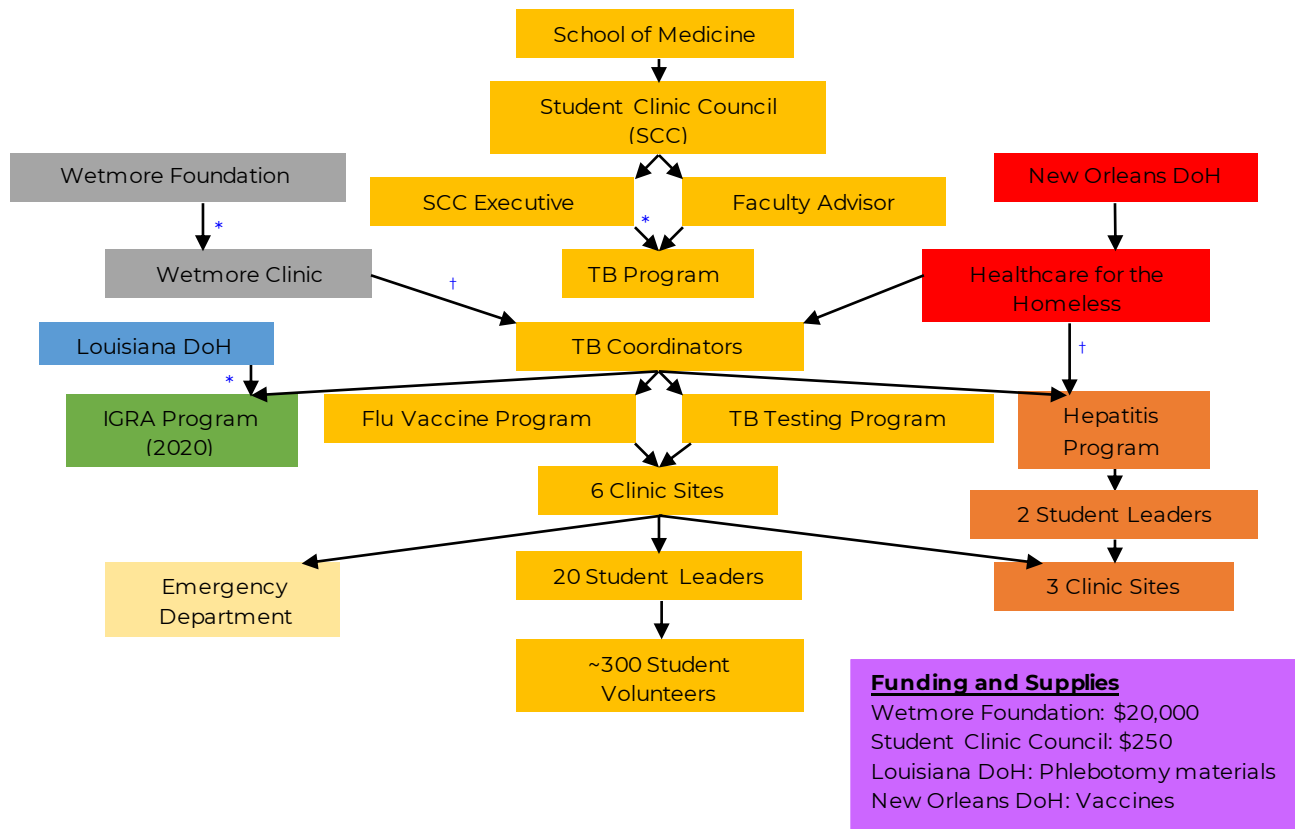
The program has many branches that work synergistically to provide services (Figure 2). It is overseen by several entities, including a state-run TB clinic, a faculty advisor, the school of medicine, and the Student Clinic Council (a body of students who oversee all student clinical activities). At the core of the TB program are three second-year medical student program coordinators. Their responsibilities include maintaining communication and funding, obtaining supplies, updating protocols, and conducting research. In

Figure 1. Program Expansion



A diagram of the program's inception and operation. Leadership turnover occurred in January of each year. TB: tuberculosis; IGRA: interferon gamma release assay

Figure 2. Program Overview



Graphical representation of the hierarchy of the TB program, including connections with local health departments and facilities, as well as relationships with other Tulane Student-Run clinical programs.

DoH: Department of Health; TB: tuberculosis; IGRA: interferon gamma release assay

*Funding

†Supplies

In addition, coordinators oversee a team of 20 medical student clinic leaders, who serve as point-of-care contacts at each site. Leaders are responsible for individual clinic needs, including stocking supplies, tracking patient data, and helping volunteers perform TB risk stratification, as well as TST placement and interpretation. Direct patient care is provided by both student leaders and medical student volunteers.

Program coordinators are trained by previous coordinators and the faculty advisor. Annual training is provided for student leaders, during which a pulmonologist educates leaders on TB and the medical and legal requirements surrounding testing and treatment. Each year, the program coordinators and nurses train incoming

first-year medical student volunteers in TST placement and interpretation.

Protocol

In 2015, a relationship was established with the Wetmore Clinic, a state-funded TB facility. In concert with Wetmore, students developed protocols and an evidence-based screening questionnaire that identifies symptoms of active TB and determines risk (Online Appendix).^{3,8-12} A full list of symptoms and risk factors can also be seen in the Online Appendix. This questionnaire was partly based on a similar initiative at another institution, with emphasis placed on recommendations from the Centers for Disease Control and Prevention (CDC).¹¹

Figure 3. Patient Flow



Flow chart used to determine the patient's trajectory within the TB program.
TB: tuberculosis

All patients who present to the clinics are evaluated, and a risk stratification score is calculated based on risk factors and symptoms (Figure 3). Those factors specific to TB are weighted more heavily than nonspecific symptoms. Using these scores, patients are divided into three groups (high, intermediate, and low risk). High-risk patients have suspicion for active TB and are provided a respirator and referred to the emergency department. Any students exposed to active TB

are referred to the student health center, where they are evaluated and treated as indicated. All confirmed TB cases are investigated by the local DoH.¹² Patients with intermediate risk are given a TST. Patients who are deemed low-risk may receive a 30-day clearance, during which they are not required to receive evaluation or testing for TB. This brief clearance, though not supported in the literature, was deemed by a Wetmore pulmonologist to be reasonable in low-risk patients

Figure 4. TB Clearance Card

TB Clearance Card

Name : _____ ID #: _____

Positive PPD Test?	Yes	No	N/A
Referred to Wetmore?	Yes	No	

Patient Cleared for: 1 month 6 months

This card expires: _____

Med Student Signature: _____

Business-card sized clearance card provided to patients as proof of TB evaluation and/or testing. This card is accepted at all local shelters and rehabilitation facilities, the Wetmore Clinic, and the local health department.

in order to conserve scarce supplies and avoid testing those who will only be residing in facilities for a few days. After the 30-day period, patients must be re-evaluated, and a TST is placed if indicated. One 30-day clearance is allowed per patient. Due to site administration preferences, only two of the six clinic sites allow 30-day clearances, while the others require TST testing on low-risk patients. Patients who anticipate a stay under 48 hours are not given a TST as they are unlikely to be present for results. They are instead given a one-week TST deferral, which is allowed once per patient. Those with a contraindication to TST, including those with a history of Bacillus Calmette-Guerin (BCG) vaccination within the previous decade, a previous positive TST result, or previous TB diagnosis, are referred to Wetmore Clinic without TST placement. Patients with a negative TST are provided with a clearance card, valid for six months (Figure 4). This card is accepted at all six Tulane TB clinics, as well as at the New Orleans branches of Healthcare for the Homeless and the Wetmore Clinic.

In order to optimize communication, a closed-loop referral system was implemented. At the time of positive TST reading, patients are provided with verbal and written educational materials from the CDC and a document detailing

next steps. In addition, patients are provided with a referral to Wetmore Clinic. Medical student clinic leaders notify the host facility as well as Wetmore of the referral. Currently, two clinical sites provide clients direct transportation to appointments, one provides bus tokens, and three do not provide transportation assistance. Due to legal restrictions, the program itself is unable to provide any form of transportation. At Wetmore, one morning a week is set aside for patients referred from the Tulane Program.

After referral, the process of determining TB status may take up to 14 days. At the initial visit to Wetmore, staff complete a patient history and symptom screen and perform an IGRA to confirm the results of the TST. At a second visit, the patient receives their IGRA results. If the IGRA is negative and the patient is asymptomatic, no further follow up is required and the patient receives a six-month clearance. A positive IGRA requires additional testing including a chest radiograph, liver function tests, and labs. At a third visit, patients receive the results of their additional testing, see a pulmonologist or infectious disease specialist, and receive treatment options. All patients with TB are offered treatment, regardless of ability to pay. In order to track referrals, the Wetmore Clinic sends monthly Health Insurance Portability and Accountability Act (HIPAA)-compliant dashboards containing status reports for all patients referred to the clinic. This includes a list of referred patients who presented for care, the results of their evaluation at the Wetmore Clinic, and their medical disposition.

Funding

The program is funded by a grant from the Charles and Elizabeth Wetmore Foundation, a charitable trust dedicated to medical care and related support programs for individuals suffering from or vulnerable to tuberculosis.¹³ In addition, the Tulane Student Clinic Council provides funding and administrative support. The program averages \$6.44 per TST placed. Overall, the annual program budget consists of approximately \$20,000 in grant funding and \$250 from the Student Clinic Council. Grant funding is used to purchase all testing and administrative supplies, while Student Clinic Council funding is used for gloves, alcohol wipes, and other cleaning supplies. The infrastructure at the Wetmore Clinic is

funded by the Louisiana Office of Public Health Region 1 TB Program.

Managing Resources

To reduce cost, increase efficiency, and provide sound medical care, certain patients do not receive TST, including those unable to return for test interpretation in 48-72 hours, those with low risk stratification who receive a one-time 30-day clearance, those with a previous positive test, and those who have received a BCG vaccine. Placing tests in patients unable to return for results leads to unnecessary re-testing and inefficient allocation of resources. Instead, they receive a short-term TST deferral, allowing more time (up to one week) to complete the TST process. Patients with a low risk stratification score may receive 30-day clearances without a TST.

Impact

Since 2017, the program has evaluated 6,198 patients. Of these, 4 were sent to the emergency department, 479 were referred to Wetmore without TST, 238 received 30-day clearances, 34 deferred, and 5,443 received TST. Of those tested, 4,155 returned for results, and 214 tested positive. To date, the program has provided referrals to higher care for 693 patients and cleared over 4,000 individuals for housing in any of New Orleans' homeless shelters or rehabilitation facilities. The program's strong relationships with the local health department, community partners, and clinic sites have allowed it to maintain longevity in the face of frequent personnel turnover.

In addition to serving the patient population of New Orleans, the TB program provides educational benefits for preclinical medical students. Early clinical experience and a commitment to service are crucial to medical education. While preceptors and volunteer work may fulfill this role, medical students given early clinical leadership have the opportunity to hone their skills, including discussing testing, results, and follow-up care with patients, while giving back to the community. This experience will allow students to enter the clinical years of medical school with a solid foundation in interacting with a diverse patient population. At Tulane, students are required to perform 50 hours of community service in their

first two years of medical school; this requirement provides a continuous pool of volunteers.

Recommendations for Similar Initiatives

We recommend that medical students or faculty seeking to implement similar initiatives make contact with the local DoH and, working in concert with the DoH and potential sites, conduct needs assessments. Unlike primary care-model student-run clinics, the TB program does not have physicians on-site during clinic shifts. There are fourteen shifts weekly between six clinic sites, making it difficult to have on-site physicians. Though medical students perform and interpret TB tests without direct physician supervision, faculty guidance is crucial to program operations. The program has a dedicated advisor who serves on faculty at two local medical schools and is a physician at Wetmore. The advisor is available by phone during all clinic shifts and communicates with program leaders monthly to discuss operations and review records. In addition, the faculty advisor provides biannual training to program leaders and supervises yearly training of volunteers, in order to ensure best practices are followed.

In the design and implementation of this program, leadership encountered challenges that may be expected at other institutions seeking to develop similar initiatives. Though most facilities were receptive to on-site testing, there was initial hesitation regarding medical students operating without direct supervision. After meeting with Wetmore staff and the program faculty advisor and reviewing training protocols, this concern was assuaged. Some clinical sites were apprehensive about clearance cards initially; however, ensuring the card was accepted at local healthcare facilities and Wetmore increased acceptance of clearance cards. Communication between all involved parties is crucial, and we found that twice-yearly written updates (including information about numbers of patients served, rate of positives tests, etc.) provide sites with concrete information regarding our efforts. We are fortunate that our institution is open to medical student initiatives; however, we realize this level of independence is not possible at all schools. For those wishing to start similar programs, we

recommend writing an operational protocol and performing a cost analysis and needs assessment in the community. Legal approval from the university is a requirement and is obtained in concert with individual clinic sites through site agreements. The legal department at Tulane University conducts annual risk assessments at each clinical site in order to ensure protocol compliance. Consistent provision of care with legally-sound protocols ensures that student-led clinical activities provide high-quality healthcare and a proper educational environment.

Limitations and Future Directions

As the program is run by medical students, frequent leadership turnover is necessary, requiring annual re-training. Student leaders serve in the coordinator position during their second year of medical school. As the program serves in a voluntary capacity, the requirements of the host facilities are paramount. For this reason, 30-day clearances have not been widely implemented, and patients in three facilities are not provided transportation to appointments at Wetmore.

Evaluation of follow-up rates and barriers to follow-up will enable a more focused approach to quality improvement. Future initiatives will include interventions to increase follow-up rates, as well as consideration for integration of treatment into the clinics.¹⁴ An agreement was recently established with the DoH to allow IGRA testing on-site, in order to mitigate the lengthy follow-up process.

Conclusion

The Tulane TB program has expanded and molded to fit the needs of the community. The program provides medical care across the city, targeting high-risk and high-need areas, rather than providing one centralized clinic. To date, 6,198 patients have been evaluated, 693 were referred to higher care, and over 4,000 received clearance to maintain residence in shelters and rehabilitation facilities. Efforts to standardize protocols have ensured organization and high standards across all clinics, so that patients can receive access to care that they otherwise may not be afforded.

Disclosures

The authors have no conflicts of interest to disclose.

References

1. TB in the Homeless Population [Internet]. CDC: Centers for Disease Control and Prevention. [LINK](#)
2. Kong PM, Tapy J, Calixto P, et al. Skin-Test Screening and Tuberculosis Transmission among the Homeless. *Emerg Infect Dis.* 2002;8(11):1280-1284. [LINK](#)
3. Figueroa-Munoz JI, Ramon-Pardo P. Tuberculosis control in vulnerable groups. *Bull World Health Organ.* 2008; 86(9):733-735. [LINK](#)
4. Gee RE. Tuberculosis Control Manual. New Orleans: Louisiana Department of Health; 2019 Apr. 40 p. [LINK](#)
5. Public Health Sanitary Code. Louisiana Department of Health; 2010 Jan. [LINK](#)
6. Rebholz CM, Macomber MW, Althoff MD, et al. Integrated Models of Education and Service Involving Community-Based Health Care for Underserved Populations: Tulane Student-Run Free Clinics. *South Med J.* 2013;106(3):217-223. [LINK](#)
7. Ai JW, Ruan QL, Liu QH, Zhang WH. Updates on the risk factors for latent tuberculosis reactivation and their managements. *Emerg Microbes Infect.* 2016 Feb 3;5(2):e10. [LINK](#)
8. Deiss R, Rodwell T, Garfein R. Tuberculosis and Drug Use: Review and Update. *Clin Infect Dis.* 2009 Jan 1;48(1):72-82. [LINK](#)
9. National Institute for Health and Care Excellence: Clinical Guidelines [Internet]. National Institute for Health and Care Excellence, Internal Clinical Guidelines Team; 2003-2020. [LINK](#)
10. Notaro SJ, Khan M, Kim C, Nasaruddin M, Desai K. Analysis of the health status of the homeless clients utilizing a free clinic. *J Community Health.* 2013 Feb;38(1):172-177. [LINK](#)
11. Anand A, Wagner C, Kong SS, et al. Improving Screening for Latent Tuberculosis Infection in a Student-run Free Clinic. *Cureus.* 2018 Apr;10(4). [LINK](#)
12. Morantz CA. Guidelines released for investigation of potential contact with infectious tuberculosis. *Am Fam Physician.* 2006 Apr 15;73(8):1460-1466. [LINK](#)
13. Charles & Elizabeth Wetmore Foundation [Internet]. New Orleans (LA); 2020. [LINK](#)
14. Peluso MJ, Hung A, Lukasiewicz A, et al. Successful Management of Latent Tuberculosis Infection in an Underserved Community by a Student-run Free Clinic. *J Health Care Poor Underserved.* 2014 May;25(2):837-862. [LINK](#)