



Centers for Disease Control
and Prevention (CDC)
Atlanta GA 30333
TB Notes
No. 1, 2014

Dear Colleague:

I hope you heard the good news that our former Director, RADM Kenneth G. Castro, MD, was chosen to receive the Lifetime Achievement Award by the North America Region (NAR) of the International Union Against Tuberculosis and Lung Disease (IUATLD). He received this prestigious award at the IUATLD NAR annual meeting in February. Please see the article about the award in this issue.

We have initiated the search for a new Director of the Division of Tuberculosis Elimination (DTBE) to replace Dr. Castro. As you know, these high-level searches are lengthy and we do not expect to have an announcement of a new DTBE Director any time soon. In the interim, I continue to serve as acting Director, DTBE, and the other acting assignments remain in place as well: Kathryn Koski is acting Deputy Director, John Jereb is acting Associate Director for Science, and Lee Ann Ramsey is acting Associate Director for Management and Operations.

We in DTBE were very sorry to learn of the deaths of two former colleagues, Dr. Charles P. Felton and Gus Caras. Both passed away in January 2014. Please read about their lives and contributions in this issue.

We are anticipating introduction of TB elimination reauthorization language in the House. This bill will provide authority for agencies involved in TB elimination. If passed and signed by the President, this would become the next TB Elimination Act, a public law, which gives federal agencies their blueprint for activities and permission to appropriators to fund the programs.

We are cautiously optimistic about the news of a possible slight budget increase in funding for TB activities. It appears that DTBE will have some of its previous funding restored, based on the information received to date, although the anticipated level is still below that of fiscal year 2012.

The topic of TB drug shortages was the focus of two events in January: the TB Task Force update, which met by conference call on January 17; and a meeting held in Washington, DC, on January 15. This meeting was convened by the National TB Controllers Association (NTCA), PATH, and the Treatment Action Group (TAG). Dr. Ken Castro and I participated by telephone; Dr. Sundari Mase and Glen Christie of DTBE's Field Services and Evaluation Branch (FSEB) attended in person. This meeting was also attended by Food and Drug Administration (FDA) staff and other interested stakeholders. We have an article about the meeting in this issue.

World TB Day is observed annually on March 24 to commemorate Dr. Robert Koch's announcement that he had determined the causative agent of TB: the *M. tuberculosis* bacterium. After discussions with DTBE staff and partners, "Find TB. Treat TB. *Working together to eliminate TB*" was selected as the theme for World TB Day 2014 in the United States. This theme was selected to encourage officials in local and state TB programs to reach

out to their communities to raise awareness about TB. It calls for everyone involved in TB control to further collaborate to find and treat TB disease and latent TB infection, focusing on TB elimination. This theme differed slightly from the Global Stop TB Partnership theme of “TB—Reach the 3 Million. Find. Treat. Cure TB.” A U.S.-specific theme was selected to better reflect the TB efforts in our country.

Many of you sent us your brief descriptions of these activities. Please go to the DTBE [World TB Day website](#) to read about your colleagues’ activities, posted at [World TB Day Activities](#).

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Note: The use of trade names in this publication is for identification purposes only and does not imply endorsement by the Centers for Disease Control and Prevention (CDC), the Public Health Service, or the Department of Health and Human Services. The findings and conclusions in the articles published in TB Notes are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

HIGHLIGHTS FROM STATE AND LOCAL PROGRAMS

Second Annual NYC World TB Day Walk

The New York City Department of Health and Mental Hygiene (NYC DOHMH) co-sponsored the *2nd Annual New York City World TB Day Walk* on Saturday, March 22, 2014. They collaborated in this event with a strong coalition of TB stakeholders:

- American Lung Association
- National TB Controllers Association
- New Jersey Medical School Global TB Institute
- New York State Department of Health
- New York City Department of Homeless Services
- Plaza del Sol Family Health Center
- RESULTS
- Treatment Action Group

The theme for this year’s walk was **One World. Zero TB**. The goals of the walk were to (1) raise TB awareness among community leaders, local politicians, and the general NYC community, (2) highlight the experiences of TB survivors and patient advocates, and (3) advocate for TB prevention and control efforts, both locally and globally.



The walk started at Union Square and ended at Judson Memorial Church, an iconic location known for its commitment to social justice. We were honored to have opening remarks from Dr. Lee Reichman about TB epidemiology, as well as testimonies from TB patient survivors and advocates. Last year, we were honored to have NYC Council Member Eugene Mathieu speak at the rally about the importance of TB prevention and control efforts in NYC. This year, the coalition invited the NYC DOHMH Commissioner of Health, as well as local community leaders and politicians. The event concluded with a presentation on TB advocacy and how community members can get involved.

The NYC World TB Day Walk represents the remarkable efforts of numerous TB stakeholders throughout the region encompassing New York and New Jersey, working in partnership, all of whom are committed to raising awareness about TB as a significant public health issue. We are pleased to have had another successful walk, and we look forward to learning about other World TB Day efforts throughout the country!

*—Reported by Martha Alexander, MHS,
 and Farah Parvez, MD, MPH
 NYC Bureau of TB Control
 and Bureau of Correctional Health Services*

Congratulations to

Dr. Kenneth Castro!

The North American Region (NAR) of the International Union Against TB and Lung Disease (UNION) is pleased to present the 2014 Lifetime Achievement Award to Dr. Kenneth Castro. This award is presented to deserving recipients who have made a significant contribution in the field of tuberculosis over an entire career. The contribution may have been in any aspect of TB, including basic science, epidemiology, public health, advocacy, patient care, education, nursing, and laboratory science. Nominees may be working in any position,

TB Notes is a quarterly publication of the Division of TB Elimination (DTBE) of the National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP), Centers for Disease Control and Prevention (CDC). This material is in the public domain, and duplication is encouraged. For information, contact

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 for other publications, information, and
 resources available from DTBE.

organization, or profession. The award is not given on an annual basis, but rather when an individual who meets the criteria of the award has come to the attention of the organization. Past awardees include Dr. Lee Reichman, Dr. Jacques Grosset, Dr. William Pape, Dr. Donald Enarsen, Dr. Anne Fanning, Ms. Sue Etkind, and Dr. George Comstock.

Dr. Castro led the Division of Tuberculosis Elimination for 20 years, during which time the U.S. saw a 63% decline in TB cases. He developed new research and program initiatives such as the TB Trials Consortium and the TB Epidemiologic Studies Consortium, the National Tuberculosis Indicators Project, and the National Genotyping Service, as well as the Molecular Detection of Drug Resistance service. Internationally, Dr. Castro is a founding member of the STOP TB Partnership and serves as an expert advisor to the World Health Organization (WHO). He has chaired numerous international conferences and contributed to the development of international guidelines in TB control. Despite this busy schedule, Dr. Castro remains accessible and approachable, inspiring new scientists and clinicians into the field, whether by a word of praise at a poster

session or by a few words in the hallway. A scientist, an advocate, a clinician, a teacher, a leader—Dr. Castro is truly an ideal candidate for an award that recognizes a life-long passion and dedication to TB elimination and the goal of zero deaths from TB.

Dr. Castro received this award in Boston on February 28. Congratulations, Dr. Castro!

—Submitted by Jane Carter, MD
 UNION NAR

Solving the Silent Crisis:

High-Level Working Meeting to Resolve and Prevent Domestic TB Drug Shortages

Introduction

Progress in eliminating TB as a public health problem in the United States is threatened by decreasing funding and by increasing problems in accessing life-saving drugs and diagnostics. A year after Treatment Action Group (TAG) and partners first convened a broad consultation on January 18, 2013, to discuss the U.S. and global TB drug shortage crisis, domestic shortages of TB products have persisted and possibly worsened. Thus, the National TB Controllers Association (NTCA), TAG, and partners determined there was a need for a follow-up, high-level meeting to find inter-agency solutions to the ongoing crisis of supply interruptions of TB drug and diagnostic products.

On January 15, 2014, TAG, NTCA, and PATH convened a small working group to explore potential solutions for more effectively preventing and responding to drug shortages. Included at this meeting were representatives from the following organizations:

- CDC, Division of Tuberculosis Elimination
- FDA, Center for Drug Evaluation and Research Drug Shortage Program
- TAG
- NTCA
- Infectious Diseases Society of America (IDSA)
- American Thoracic Society (ATS)
- Community Research Advisors Group (CRAG)

- Global Drug Facility (GDF)
- RESULTS
- Association of State and Territorial Health Officers (ASTHO)
- Biomedical Advanced Research and Development Authority (BARDA)

Of note, the causes of the recent shortages of TB drugs and biologics are diverse, and vary based on manufacturer and product. This complicates the ability to intervene with a single solution. Some manufacturers report that compromises in the sterility of the production process contributed to the shortage. Others indicate that a lack of quality in some of the active pharmaceutical ingredients used in the product forced shutdown of the production of the product. Still others indicate that a higher demand than supply resulted in the need to allocate existing supply, leading to shortages. However diverse the causes, the outcome for TB control is consistent: we are left without the tools we rely on to both detect and treat infection and disease.

Findings and recommendations from the discussions

The group discussed a wide-ranging set of potential solutions, examining the merits of each, identifying barriers to overcome, and determining next steps. Lead interventions focused around the following:

1. Creating a rotating, vendor-managed inventory (VMI) reserve

A VMI option was agreed to be a good short- to medium-term solution for responding to acute shortages. Since most individual states lack the volume of cases and resources to create functional individual stockpiles, it was agreed that a national system would be the only realistic solution, and it would probably save money by eliminating redundancy of efforts. The main challenge anticipated is to determine resources, as well as the specific criteria under which reserves could be used.

2. Centralizing procurement

The group suggested that in the long term, centralizing procurement could streamline it for programs and facilitate supply predictions for manufacturers, and would create pooled demand and

better communications. At the global level, this pooled procurement model is exemplified by GDF, and most participants felt that the U.S. should attempt to procure through GDF, as well, if regulatory hurdles could be overcome, especially because GDF is funded primarily via the U.S. Agency for International Development (USAID). Even if U.S. programs were able to procure drugs through GDF, the consensus was that a centralized system for managing requests and communicating information would still be necessary. This could take the form of a hybrid model (one in which procurements were national, but payment and distribution were regional) or a fully centralized model (in which a U.S.-GDF procurement system would be created). The main challenges expected are limited resources and a location for the system.

3. Expanding the pool of U.S. suppliers

Discussions focused on potential mechanisms for stimulating the U.S. registration of existing quality-assured sources of TB products. These included potentially receiving fast-track review status (following the PEPFAR precedent), waiving or finding incentives to counteract user fees, leveraging GDF relationships, and providing technical assistance to manufacturers to facilitate registration. These options are potentially challenged by regulatory inflexibilities or difficulties identifying resources to create incentives for costly and time-consuming FDA registration.

4. Expanding markets to maintain existing U.S. suppliers

In addition to encouraging the registration of GDF manufacturers in the United States, the group discussed the potential to encourage current U.S.-approved manufacturers to supply to GDF and benefit from the much larger global market for quality-assured medicines to which the GDF provides access. This larger global market could encourage continued manufacturing for existing suppliers through increased stability and volume.

5. Improving communications

When developing a centralized system or alternative solution, the group felt an improved communication

infrastructure should also be developed to ensure that stakeholders can receive and provide up-to-date information about shortages. The GDF system was considered an example for adaptation, although it was recognized that a U.S.-specific system would be needed.

Next steps

As a way to extend the discussion and work towards implementation of the solution, five concrete steps were selected:

- Create a rotating, vendor-managed inventory reserve
- Centralize procurement
- Expand the pool of U.S. suppliers
- Expand markets to maintain existing U.S. suppliers
- Implement cross-cutting approaches

The group agreed that additional meetings would probably be necessary to advance progress, detail action plans, and bring in important stakeholders who were not included in this preliminary meeting (e.g., representatives from the pharmaceutical industry). Progress on this important work, including decision-making about the most viable options and success towards addressing potential barriers, will be provided to TB Notes and posted on the NTCA and TAG websites.

—Submitted by Erica Lessem, TAG
 Donna Hope Wegener, NTCA
 Kenyon Farrow, TAG

NTCA UPDATES

2014 National TB Conference

The theme for the 2014 National TB Conference is *Sharing the Vision of TB Elimination*. The National TB Conference will be held at the Grand Hyatt Atlanta in Buckhead June 11–13, 2014. Following are some highlights of this year’s conference:

- *Looking where the light is bad—What’s really limiting treatment of latent TB infection?* Keynote given by Dr. Dick Menzies

- Joining Dr. Menzies in the opening plenary are Drs. Jonathan Mermin (Director, NCHHSTP, CDC) and Jenny Flood (NTCA President and CA TB Controller), who will outline the vision for TB elimination
- Faculty include staff from state, big city, and territorial TB control programs
- NSTC and NTNC, sections of NTCA, will hold educational sessions on June 10
- Post-conference meetings on June 13 include U.S. Mexico Border Summit and Challenges and Issues in Ensuring High Quality of TB Surveillance Data

Conference registration information, including instructions for submitting abstracts for poster presentation, is available on the NTCA website, www.tbcontrollers.org.

Call for 2014 NTCA Awards

Do you know someone who deserves to be recognized by their peers for their leadership, professionalism, and commitment to TB control? Now is your chance to give them that recognition. Nominations for the 2014 NTCA Awards are now being accepted. These awards, started in 2010, are designed to honor those in the TB community who have demonstrated leadership, professionalism, and passion for their work in TB control. The deadline for nominations is April 30, 2014. The form and instructions for submitting a nomination are available on the NTCA website, www.tbcontrollers.org.

The NTCA Award categories are as follows:

- **TB Controller of the Year**—This is the National Tuberculosis Controller’s highest award; what TB controllers are all about! It recognizes an outstanding contribution and impact on tuberculosis prevention and control at the local, state, regional, or national level.
- **Carol Pozsik Nursing Award**—honors exemplary care, service, dedication, or leadership in the field of TB nursing.

- **William Stead Clinician Award**—recognizes outstanding commitment and performance by a clinician providing tuberculosis care, leadership, or mentoring.
- **Ed Desmond Award**—honors exemplary service, dedication, or leadership to a tuberculosis laboratory professional.
- **Robert Koch Award**—recognizes outstanding contributions with a clinical, epidemiological, or academic focus by a tuberculosis researcher in the quest to eliminate tuberculosis.
- **Dixie Snider Award**—recognizes a CDC employee who has provided outstanding support, through partnership with a state or local tuberculosis community, in the interest of tuberculosis control and prevention.
- **Charles DeGraw Advocacy Award**—recognizes an individual or organization that has made an outstanding effort or achievement in advocating for increased support and recognition of tuberculosis control and prevention efforts.
- **Joe Ware Partner Service Award**—recognizes an organization that has made a significant effort and/or contribution to the mission of tuberculosis control and prevention through advocacy and partner activities.

NTCA Personnel Changes

NTCA is pleased to announce the newest member of the central office team—**Jennifer Kanouse**. Jennifer was named NTCA’s **Director of Communications and Member Services**, effective January 15, 2014. Since 2009, Jennifer has been an important member of the NTCA team, serving on a part-time basis as a Special Projects Coordinator. Jennifer has an instructional design background and was previously a member of the Curry International TB Center’s staff. She joins a staff of two (Eva Forest and Donna Hope Wegener) providing instrumental support to the NTCA Board, NTCA committees and workgroups, the NTCA membership, and TB control programs.

—Submitted by Donna Hope Wegener
NTCA

TB PROGRAM EVALUATION NETWORK UPDATES

Tools for Teach Back: Medication Safety Project

Background and statement of problem

Low health literacy is a well-documented problem in the United States. Nearly 9 out of 10 U.S. adults have difficulty using routine health information; only 12 percent of English-speaking adults in the United States have proficient health literacy skills. Recent refugees and immigrants are among the populations most likely to experience limited health literacy.¹ Maine detects an average 450 latent *M. tuberculosis* infections annually, of which 80% are in foreign-born persons. (Note: while latent TB infection [LTBI] is not a nationally reportable condition, some states have implemented reporting of LTBI; Maine is among these.) In Maine, as in other states, public health nurses (PHNs) have the role of educating patients about the signs and symptoms associated with isoniazid (INH) therapy, i.e., hepatotoxicity. Despite these efforts, there is evidence that not all patients understand the health risks, thereby compromising their LTBI treatment.

The Public Health Nursing Program and the TB Program are in two separate divisions within the Maine Center for Disease Control and Prevention. However, they work closely together on prevention, diagnosis, treatment, and management of LTBI and TB disease.

During 2010–2011, two patients in Maine with LTBI were hospitalized for acute INH-associated hepatotoxicity; one of the hospitalized patients was U.S. born, with a primary language of English. Each patient had received Public Health Nursing Program services, including, at a minimum, the following:

- Monthly in-person education (including provision of educational materials) about signs and symptoms of potential adverse events and steps to take if they occur (stop taking medicine and contact provider), and
- Monthly PHN services, which include being monitored for adherence to, and tolerance of, the prescribed treatment regimen.

Investigation of the first case by the national Centers for Disease Control and Prevention (CDC) revealed that standard procedures had been followed by all public health staff providing TB services to the patients. The patients had been informed more than once about signs and symptoms of potential adverse events of INH, as well as what to do if such events occurred: stop taking the INH and call their health care providers (PHN or physician). Both patients had continued to take INH despite worsening symptoms, and neither called a health care provider to report the events. CDC investigators who reviewed the two illnesses recommended that consideration be given to increasing the amount of education and information provided to LTBI patients about the signs and symptoms of potential adverse events caused by INH and the patient's proper response.

Methods: pilot-project implementation, April 2012–April 2013

In 2011, staff of the Maine TB Program and the Public Health Nursing Program planned and developed a pilot project to implement the CDC recommendations. The main goal of the project was to improve the education provided to LTBI patients about the risks of INH therapy and actions to take if signs and symptoms of an adverse event occurred. The TB program contracted with a graphic designer and worked with him to develop the images to be used in the educational materials. In collaboration with the PHNs, images were chosen depicting the side effects potentially associated with INH therapy, to use on education materials. The PHNs were also asked to give their preferences for the items that would display the medication safety messages.

After reviewing all of the LTBI referrals that Maine had received the previous year, the team found that the majority of individuals listed country of birth as Somalia and their preferred language as Somali. For this reason, despite the fact that neither of the two prior patients with adverse events were Somali, the project team chose Somali participants for a focus group and chose that additional language for the materials. Thus, a focus group of Somali women, most of whom spoke Somali and not English, met to assist in the development of educational materials culturally and linguistically matched to the needs of

these women and to choose images most representative to them of potential adverse events.

Staff of the TB and PHN programs worked together to develop patient education materials that would meet the cultural and linguistic needs of LTBI patients (8½" x 11" tear sheets, pill box cover, calendar, and magnet; Figures 1 and 2). These include images of signs and symptoms of INH adverse events and steps to take if any occur. A written description of each image was provided in Somali and English on the tear sheet.

In addition to these materials, the Teach Back method was used to improve PHN-patient communication. Teach Back is a teaching method in which the learner repeats back what he or she heard from the instructor to verify correct understanding of the information. If what is repeated is inaccurate, the messages and the explanations are repeated until the learner's understanding and recall are both accurate.

The team also developed a four-question interview form (Figure 3). The interview form, together with the Teach Back technique, was designed to capture patients' demonstration of their understanding of the name of their LTBI medication, eight potential signs and symptoms of adverse events of the medication, and what they should do if they experienced any of those signs and symptoms.

Training for the project and the Teach Back method was provided for PHNs, both in person and through Adobe Connect, in April 2012. (Note: Adobe Connect is a web conferencing platform for web meetings, eLearning, and webinars.) This marked the start of the pilot project.

During LTBI treatment, a PHN is assigned to every high-risk patient, including foreign-born patients, and conducts monthly LTBI visits. All new high-risk LTBI patients taking INH were eligible to enroll in this project. During the project period, on visit #1, the PHN was to complete the four-question interview to determine the patient's baseline recall of information about INH. The PHN would use the calendar, pill box, and Teach Back technique to re-instruct the patient. On visit #2, Teach Back was to be used with tear sheets to educate on signs and symptoms of adverse

events. On visit #3, the PHN would use the same four-question interview to assess the patient's recall of signs and symptoms of adverse events and what to do if they occur. After each visit, the PHN was asked to document that Teach Back was used and to fax the interview forms to the TB control staff, and also to enter the information into CareFacts™, the electronic medical record system used by PHNs.

For the duration of the project period, the PHNs were asked to document that they had provided a specific medication safety message to patients using the interview form and the Teach Back methodology. Several months into the project, PHNs integrated the interview form into the electronic medical record system, CareFacts™, so that PHNs could fill out the electronic interview and not have to fill out and fax the paper form. The PHNs were then able to use the interview in paper form, electronic form (integrated into CareFacts™ after the project was initiated), or both to assess the patient's knowledge and to deliver the medication safety message.

Throughout the project, TB Control and nursing staff met routinely to discuss progress and challenges and make necessary adjustments. Midway through the project, TB control and PHN staff completed a preliminary analysis of data from the interview forms and surveyed the PHNs. In April 2013, the 1-year pilot project was completed and analyzed, and PHNs adapted a modified version of the project into their LTBI policies. The findings were shared with PHNs and providers through presentations at PHN Supervisor and TB Cohort Review meetings.

Analysis and significant findings

Upon project completion, TB control and nursing program staff analyzed three elements:

- The information from the interview forms, to look for change in patient knowledge;
- Change in documented patient knowledge, behavior, and status (KBS) related to LTBI medication adverse events; and
- PHN experience and ideas, via electronic survey and informal interviews.

Analysis of interview forms

Analysis shows that the goal of delivering the safety messages and assessing patient response at the first and third PHN visit was partially met. The electronic health record reflected that 226 patients had received LTBI services by PHN. Of these, 74 patients (33%) had first and third visits documented by interview form completion. A variety of patient and PHN circumstances adversely affected the ability of the PHNs to provide first- and third-visit interviews. Patients changed place of residence and experienced complex health and cultural issues, and there were data entry errors. As a result, 152 (67%) of the patients eligible to be in the project did not have complete data and were therefore unable to be analyzed for change in knowledge or behavior related to LTBI medication safety.

Among the 74 patients with both first and third visits documented, 17 (23%) were unable to name the medication at the first visit, but *were able* to name it at the third visit. Also, 15 (20%) of project patients were unable to verbalize any of the eight signs and symptoms at their first Teach Back visit, but were able to report on an average of three additional signs and symptoms by their third visit. Most notably, 61 (83%) of patients who received a third visit gave the desired response that they should first stop their medications and then call a PHN or provider if they experienced signs and symptoms. No signs and symptoms of severe adverse events occurred during the project period.

Analysis of patients' KBS

Nursing assessments were documented in each patient's nursing care plan using the Omaha System terminology.² This system provides PHNs with a mechanism for describing patient outcomes related to their knowledge, behavior, and status (KBS). PHNs rated and recorded their patients' KBS on initial, interim, and discharge visits. The KBS ratings documented for former patients discharged from the PHN project (n=127) and those still being served by PHNs (n=44) by project completion were compared to initial KBS ratings collected when the patient was first enrolled by a PHN. (Note: 45 patients did not receive a KBS rating beyond the initial rating, thus their data could not be included in and analyzed for this project.) Of the 171 patients who received initial

and subsequent ratings, both the discharge and last rating averages showed improvement when compared to average initial KBS ratings. Delivery of project services probably contributed to this improvement, but was not exclusive of other nursing service variables.

Post-project, the PHN program has elected to continue the main components of this project, with modifications. Documentation of using Teach Back is now exclusively electronic and is required at the first PHN visit, but at subsequent visits is left to the discretion of the nurse. The PHN program plans continued data analysis of project results as part of its ongoing quality improvement, strategic planning, and performance management activities.

Analysis of Nursing Survey

In October 2012, a nine-question electronic survey using the tool Survey Monkey was sent to all 50 PHNs, who were encouraged to participate. Thirty (60%) completed the survey. Key findings included the following:

- If the same materials were ordered again, 90% of PHNs surveyed would use them.
- PHNs selected the calendar and tear sheets as most useful, and the magnets and pill boxes as least useful.
- In addition to Somali and English, PHNs requested the materials be translated into additional languages; French was the most requested language by PHNs.

TB control staff had resources to translate the tear sheets into one additional language, so French was selected. Because of program budget constraints, only the tear sheets could be re-ordered, not the calendars, magnets, or pill boxes. The health department now offers the following language and INH medication options for tear sheets: French with English and Somali with English.

Limitations

- When the interview form became available in CareFacts™, and faxing the form was no longer a requirement, PHNs did not complete a

significant number of Visit 3 electronic forms, leaving 152 (67%) of patients who were in the project with incomplete data.

- There was some variability among PHNs in skill, comfort, and experience with LTBI patients and the Teach Back method.
- It was unknown if PHNs' personal preferences for certain tools introduced bias.
- There was no control group—all new LTBI patients were supposed to be enrolled in the project.

Conclusions

By increasing some patients' knowledge about recognizing and correctly responding to signs and symptoms of INH adverse effects, we were able to partially achieve our original project goal. We cannot definitively prove a direct causation between this project and actual improved patient medication safety, because other nursing interventions occurred simultaneously. However, PHNs' use of educational tools and the Teach Back technique did increase patient recall of signs and symptoms of INH adverse events, and actions to take if these occur.

In addition, KBS analysis showed that patients were taking action to improve their health. Most notably, there were no severe adverse events related to medication toxicity in the project period. This increase in patient knowledge and behaviors will ideally translate into fewer adverse events, improved adherence to LTBI therapy, and higher treatment completion rates. Through this and other collaborative projects, we aim to achieve a reduction in the number of TB cases in Maine, our ultimate and long-term goal.

Recommendations include further analysis of

- CareFacts™ data
- Participation levels of each PHN (i.e., what percent of each PHN LTBI patients were included in both first and third visits)
- Tools used, and whether PHN or patient choice influenced outcome
- Patient experiences and language preferences

Figure 1: INH tear sheet in English and Somali



If you take Isoniazid (INH) and have any of these side effects, stop taking INH and call your doctor or public health nurse.
Hadaad qaadatid daawada tiibshada (INH) oo aad isku aragtid mid ka mid ah calaamadahan, jooji daawada oo wac dhakhtarkaga ama kalkaalisada caafimaadka bulshada (neerasta).



Figure 2: Educational materials — tear sheets, pill box, calendar, magnet



Figure 3: Interview Form

Date started treatment: / /		Date interviewed: / /		PHN Name:							
Interpreter: Y <input type="checkbox"/> N <input type="checkbox"/>		PHN Visit Number: 1 <input type="checkbox"/> 3 <input type="checkbox"/>		Patient Identifier: other _____							
1 What is the name of the medicine that you are taking for LTBI?											
INH <input type="checkbox"/>		Isoniazid <input type="checkbox"/>		Rifapentine <input type="checkbox"/>							
Other: _____		Don't know <input type="checkbox"/>									
2 Has anyone discussed the possible side effects of INH with you? Y <input type="checkbox"/> N <input type="checkbox"/>											
If yes, who? Physician <input type="checkbox"/> PHN <input type="checkbox"/> Other <input type="checkbox"/> _____											
3 What are the side effects that you should watch for when taking INH?											
Nausea or vomiting	Stomach pain	Dark Urine	Yellow eyes or skin	Fever > 3 days	Weight loss	Feeling tired	Rash or itching	Don't know	Other: _____		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____		
4 What should you do if you have any of these side effects?											
Stop INH <input type="checkbox"/>		Call <input type="checkbox"/>		Who _____		Other _____		Don't know <input type="checkbox"/>			

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—Reported by Dalit Wolfe, RN, BSN, MPH,
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**COMMUNICATIONS, EDUCATION,
AND BEHAVIORAL STUDIES
BRANCH UPDATES**

**The 12-Dose Regimen for Latent TB
Infection Patient Education Brochure Is
Now Available in Spanish**

The Division is pleased to report that the *12-Dose Regimen for Latent TB Infection* patient education brochure has been translated into Spanish and is available for download from the CDC website.

This brochure was developed for clinicians to use with patients while discussing the 12-dose regimen for the treatment of latent TB infection. The brochure contains information on latent TB infection, the 12-dose regimen, treatment schedules, and adverse events. Space is provided to write in treatment schedules and clinic/office contact information.

It is currently available for download in two paper sizes. It may be printed on two sheets of letter-sized paper (8.5 x 11 inches), or one sheet of ledger-sized paper (11 x 17 inches) that can be folded in half to create a 4-page brochure.

To access the brochure on the CDC DTBE website, please go to TB Publications and Products: Pamphlet, Brochures, Booklets, and click on “The 12-Dose Regimen for Latent TB Infection-Patient Education Brochure.” This link will connect to a page dedicated to this brochure, with information provided in English. You can access the brochure webpage directly at <http://www.cdc.gov/tb/publications/pamphlets/12-doseregimen.htm>.

Under the title of the page, the link to the Spanish version is on the left side. (Click your mouse on the word “Español.”) You can access the Spanish version of the webpage directly at <http://wwwdev.cdc.gov/tb/esp/publications/factsheets/folleto.htm>.

—Submitted by Joan Mangan, PhD, MST
Div of TB Elimination

New TB Personal Stories Videos

Patients’ stories detailing their experiences with TB disease and latent TB infection are now available on [CDC’s TB website](#) as part of the TB Personal Stories project, which began in 2013. The TB Personal Stories project supports the goal of raising awareness about TB in the United States. Specific objectives include communicating the following key points:

- TB still exists, and it poses serious health consequences if not controlled;
- Real people still get TB every day and have been helped with treatment; and
- Most importantly, public health provides the critical support that TB patients need in order to be diagnosed and cured of TB.

Four videos are available. The longest video, [TB Personal Stories](#), is a compilation that includes commentary from Dr. Kenneth Castro, former Director of the Division of Tuberculosis Elimination,



as well as interviews with three TB patients.

Another [video](#) available is from a former patient named Santos. Santos first

heard about TB when his infant son became ill and was diagnosed with TB meningitis. Santos then learned that he himself had latent TB infection. He started treatment for latent TB infection, but didn’t finish it. Years later, he came down with TB disease. Santos now serves as a peer counselor at his county health department for other people who have latent TB infection. Learn more about his story [here](#).

Deo's story, which relates his reactions to being diagnosed with latent TB infection, is also available on [video](#). Deo was born in Bhutan and worked as a medical professional before



moving to the United States. A health screening when he arrived in the country revealed he had latent TB infection. Learn more about his story [here](#).



Tri's experience with TB disease is detailed in his [video](#). Tri found out he had TB shortly after

beginning college. After 9 months of treatment for TB disease, Tri is back doing what he loves—playing basketball. Learn more about his story [here](#).

We are hoping to add additional stories from TB patients, so if you know of a former or current TB patient who you think would be a good fit for this project, please ask him or her to contact Nicole Richardson-Smith at ewo0@cdc.gov or Ann Lanner at lah1@cdc.gov. The ideal candidate would be an adult (18 or over) patient who

- Was successfully detected, treated, and cured of TB;
- Would be willing to appear in a print or video story that could be seen by many people; and
- Would be a good candidate for videotaping—articulate and with a compelling story to tell.

—Reported by Nicole Richardson-Smith, MA
and Ann Lanner
Div of TB Elimination

INTERNATIONAL RESEARCH AND PROGRAMS BRANCH UPDATES

IRPB Biennial Report 2011–2012

The mission of DTBE's International Research and Programs Branch (IRPB) is to contribute to the reduction of TB prevalence and mortality globally, as well as among foreign-born persons in the United States. Activities are carried out through partnerships with other U.S. government (USG) agencies and various international agencies and groups.

A number of IRPB's significant accomplishments from 2011 through 2012 have been highlighted in its Biennial Report. These achievements were made possible through collaboration with and extensive support from our USG partner agencies and our partner governments' TB programs, TB laboratories, and HIV/AIDS control programs. The Biennial Report includes a compilation of select accomplishments and proposed activities which embody IRPB's mission and focus areas. Please access the report at the following link:

http://www.cdc.gov/tb/topic/globaltb/pdf/IRPB_AR.pdf



—Reported by Kawi Mailutha, MPA
Div of TB Elimination

LABORATORY BRANCH UPDATES

Southeastern Mycobacteria Meeting

Members of the Applied Research Team from DTBE's Laboratory Branch participated in the 5th Southeastern Mycobacteria Meeting in Birmingham, Alabama, January 24–26, 2014. This conference is designed to showcase current research, build relationships, and foster collaborations among attendees.

The Applied Research Team presented seven posters, three of which focused on the team's current work aimed at improving the detection of pyrazinamide (PZA) resistance. PZA resistance is problematic for growth-based assays. Alexandra Mercante described a modified protocol for determining PZA resistance via the widely used MGIT system. This protocol uses a reduced inoculum size, leading to a decrease in false resistance. Kristin Birkness presented data describing development of a colorimetric assay in *E. coli* for detection of the effects of mutations in *pncA*, the gene which encodes pyrazinamidase (PZase) activity and can predict resistance to PZA. The assay was applied to 88

isolates with *pncA* mutations. Prediction of resistance based on PZase activity as determined in the *E. coli* assay correlated well with MGIT results. The Applied Research Team's ongoing effort to construct over 1,000 mutations in *pncA* and assess these mutations in the previously described *E. coli* assay was detailed on Kelsey Hughes' poster. The team has thus far completed construction and evaluation of 121 *pncA* mutations, observing highly reduced levels of PZase activity in a number of the mutations assessed.

The Ion Torrent Personal Genome Machine (PGM) can generate up to 6 million bases of sequence data from as many as 96 individual samples in about 2 hours. Melisa Willby's poster presented the team's efforts to simplify large-scale drug-resistance surveillance efforts through development of a multiplexed assay for detecting mutations associated with drug resistance. In initial experiments comparing Ion Torrent results with traditional sequencing, the Ion Torrent Suite software did not find all expected mutations. However, when the data were examined directly by the investigators, all expected mutations were found. This highlighted the need for improvements in the current sequence analysis software programs. These experiments also emphasized the need for a more streamlined approach to sample preparation. The poster described preliminary efforts to improve efficiency and decrease cost.

Spoligotyping is an assay used to genotype *M. tuberculosis* strains. Paige Gupton presented results of a pilot study in which the *M. tuberculosis* spoligotyping assay was transferred from the currently used Luminex platform to the Ion Torrent PGM. Using the Ion Torrent assay, 270 previously spoligotyped samples were reanalyzed, with a resulting 100% concordance between the two platforms. The Applied Research Team began spoligotyping on the Ion Torrent in October 2013 for routine surveillance.

Improved vaccination strategies against TB are urgently needed, for example, approaches to boost immune responses induced by the current vaccine, BCG. Design of these strategies has been hampered by a lack of knowledge of the kinetics of the host immune responses induced by BCG vaccination.

Subhadra Nandakumar described longitudinal changes in the effector functional abilities of BCG vaccination induced T-cells and their association with the protection against *M. tuberculosis* over a period of 2 years in the mouse model. Her presentation highlighted the lifelong BCG persistence and its association with the attrition and exhaustion of T-cell response and waning of protective efficacy against *M. tuberculosis* in mice. Her results questioned the empirical development of BCG-booster vaccines and emphasized the pursuit of strategies that maintain superior T-cell functional capacity.

Expanding on this topic, Suraj Sable presented prime-boost vaccination strategies using BCG and an effective subunit vaccine based on the adhesin, Apa. His presentation described the ability of Apa subunit vaccine to boost waning BCG immunity in older mice regardless of its native or recombinant form. These results have implications for the development of effective prime-boost vaccination strategies against tuberculosis.

The posters and talks presented by other attendees provided an important glimpse into the state of current research in the mycobacteria field. Additionally, this conference provided a valuable forum for not only sharing our current research with the mycobacterial community, but also for discussing future directions and possible collaborations. As we pursue a greater understanding of *M. tuberculosis* from these and other activities, we hope to be part of achieving the U.S. goal of TB elimination.

—Submitted by Melisa Willby, PhD,
and Suraj Sable, DVM, PhD,
Div of TB Elimination

SURVEILLANCE, EPIDEMIOLOGY, AND OUTBREAK INVESTIGATION BRANCH UPDATES

Report on the DTBE Homeless Work Group

As TB incidence decreases in the United States, focus has turned toward populations at high risk for exposure to *M. tuberculosis* and for progression to TB disease. One important group includes persons

experiencing homelessness. In the United States, the condition of being homeless within 12 months of TB diagnosis is reported in about 6% of TB cases. The common use of congregate settings such as shelters increases the possibility of exposure to TB. This population has high TB case rates relative to the general population—homeless people have a 10-fold higher risk of TB than the general population. In addition, homeless persons have higher rates of HIV infection, substance use, and mental illness than the general population, thereby increasing their likelihood of progressing to TB disease.

Over the last decade, CDC has been involved in helping to investigate and control numerous TB outbreaks involving homeless persons. These recent investigations have demonstrated that outbreaks including TB patients who are homeless involve large numbers of persons (both secondary cases and contacts), relative to those outbreaks not including homeless patients. Despite the recognized risk of TB among persons experiencing homelessness, few evidence-based TB control practices are directed toward interruption of *M. tuberculosis* transmission in this population.

To help address these issues, DTBE has convened a work group to address TB among persons experiencing homelessness. The mission of the DTBE Homeless Work Group (HWG) is to facilitate the prevention, control, and elimination of TB among persons experiencing homelessness.

One of the first activities of the HWG was to assist in coordination of a meeting regarding TB control with other federal and non-profit agencies that work addressing housing and healthcare in persons experiencing homelessness. The U.S. Interagency Council on Homelessness hosted the meeting. In attendance were representatives of the departments of Housing and Urban Development, Health and Human Services, and Veterans Affairs, the Substance Abuse and Mental Health Services Agency, the National Health Care for the Homeless Council, the National TB Controllers Association, Stop TB, the National Alliance to End Homelessness, and the National HIV/AIDS Housing Coalition, among others. Drs. John Bernardo and Sapna Morris presented information regarding TB infection and

disease, and how TB affects persons experiencing homelessness. The information was well received, and many of the attendees acknowledged that their grantees may not be aware of the potential problems that TB disease or infection could present for their agencies or the risk of transmission that could occur if a patient were to go undiagnosed.

Plans have been made for DTBE and local TB programs to provide educational messages to these federal and non-profit partner agencies on TB infection, TB disease, and infection control measures (or measures to reduce transmission). In addition, these partner agencies are enthusiastic about sharing educational messages on housing, substance use treatment, and advocacy for persons experiencing homelessness with TB control programs.

—Reported by Sapna Bamrah Morris, MD
Div of TB Elimination

NEW CDC PUBLICATIONS

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PERSONNEL NOTES

Paul Lawrence Grzybowski has joined the Applied Research Team of the Laboratory Branch as an Oak Ridge Institute for Science and Education (ORISE) Fellow. He will assist in the spoligotyping of *M. tuberculosis* (using the Ion Torrent instrument). Paul received his B.S. degree in chemistry from the

Georgia Institute of Technology in 2012. During his time at Georgia Tech, he participated in research exploring new reaction mechanisms using indium catalysts to offer an efficient and cost effective way to synthesize large [heteroaromatic compounds](#). These mechanisms were then used in the synthesis of flinderole C, a natural antimalarial product. Paul is interested in merging drug design and development with microbiology to find new methods to improve public health.

Kartee Johnson has joined the Applied Research Team of the Laboratory Branch as an Oak Ridge Institute for Science and Education (ORISE) Fellow. Kartee will be helping evaluate the effect of the enzymatic activity of pyrazinamide (PZA) mutations in *M. tuberculosis*. This work will contribute to a better approach for determining drug resistance through conventional and molecular methods, important in clinical practice and clinical trials of new drugs. He received his B.S. degree in biology with a minor in French from Berry College, Rome, Georgia, in 2013. During his time at Berry, he participated in research projects including analyzing the spatial and temporal patterns of sexual dimorphism and sex ratio on *Lindera benzoin* (also known as spicebush), which was recently published in the Journal of the Torrey Botanical Society; and also examining the activities of a specific vaccine in mice.

Christine Ho, MD, MPH, joined the Surveillance, Epidemiology, and Outbreak Investigations Branch as the Team Lead of the Epidemiology Team on February 3, 2014. Christine has a BA in Biophysics and Art from the University of California, Berkeley, which explains everything. She has an MPH in epidemiology, and she received her MD in 1993 and completed her residency at the University of California, San Francisco. She is Board Certified in Internal Medicine.

Christine was an Associate Professor of Medicine at the University of California, San Francisco, before joining CDC as a field Medical Officer in San Francisco, where she supervised contact investigations and led the development of new policies and procedures to improve completion rates for contact evaluations. While in San Francisco,

Christine was the Co-Principal Investigator there for the Tuberculosis Epidemiologic Studies Consortium.

Christine moved to Atlanta in 2012 as a Medical Officer in the Field Services and Evaluation Branch. In that role, she has led the project on Post-marketing Surveillance of 12-Dose Isoniazid and Rifapentine, has co-chaired the DTBE workgroup on the Affordable Care Act, has been the CDC liaison for the federal corrections healthcare council, and has participated as a "Think Tank" member. In her new job with SEOIB, Christine will lead TBESC-II at a crucial juncture as the consortium decides its future direction in understanding and improving screening for latent TB infection.

Bryan Kim has left DTBE to take a position in the Division of Global HIV/AIDS. His last day in IRPB was March 21, and he started his new position in DGHA on March 23, 2014. In his new position, Bryan will serve as the Deputy Director for CDC's DGHA program in Lesotho based in Maseru. He will serve as the principal management and administrative person for all CDC/DGHA activities in country. Bryan will be responsible for formulating the program budget and presenting and defending resource requirements needed to carry out the office's long-term goals and objectives. He will oversee the overall planning, directing, and execution of several programmatic activities for the office. He will also be responsible for providing program and operational support to Lesotho's President's Emergency Plan for AIDS Relief (PEPFAR) activities.

As DTBE continues to increase its TB activities in Lesotho, Bryan will continue to provide in-country administrative and technical support to implement these activities. These activities include our ongoing TB drug resistance survey, and potential support to future Global Fund MDR TB technical assistance and TB/HIV related projects in Lesotho.

Bryan has been with DTBE/IRPB for 10 years, most recently serving as the Deputy Branch Chief for IRPB. Although we are sad about Bryan leaving the Branch and the Division, he will be in a key position to facilitate DTBE/IRPB's collaborative work in Lesotho and Southern Africa. Bryan has been interested in working overseas for several years and this is a wonderful opportunity for him.

Kathryn Koski is the winner of the January NCHHSTP Director's Recognition Award. Kathryn receives this award in recognition of her planning, professional leadership, and exceptional coordination of four unprecedented events over the last 8 months. In May, DTBE began coordinating efforts to move from Corporate Square's Building 11 to Building 12. Already underway at the time was DTBE's response to the budget sequestration and planning for a potential government shutdown. To add another layer of complexity, the Division Director and Deputy Director had recently accepted long-term details. Throughout the last 8 months, it is remarkable that despite intense pressure, Kathryn never lost her composure or sense of humor, and remained calm, approachable, compassionate, and committed to public health. She's been able to lead DTBE through a smooth office space transition, re-work the Division budget for sequestration, plan for the furlough, and serve as Acting Deputy Director without compromising her work ethic or jeopardizing the quality of her work.

Bonnie Plikaytis is serving as acting chief for the Laboratory Branch until a new chief can be selected. Bonnie has 35 years of service as a microbiologist at CDC, 25 of which have been in the mycobacteriology laboratory. In 2007 she became the deputy for the Laboratory Branch. She is no stranger to the responsibilities of the branch chief position, having served as acting branch chief for 18 months from November 2008 until June 2010. During her previous time as acting chief, she laid the foundation for the current portfolio of branch activities including the molecular detection of drug resistance service, applied research on mechanisms of drug resistance, and systems research to strengthen laboratory capacity. We thank Bonnie for her willingness to serve while DTBE recruits a permanent Laboratory Branch Chief.

Benjamin (Ben) Silk, PhD, Lieutenant Commander, U.S. Public Health Service, has joined the Molecular Epidemiology Activity in SEOIB, DTBE. Ben has over 15 years of experience in surveillance, outbreak investigations, and applied research related to infectious diseases. He began his career as a Peace Corps Volunteer in El Salvador. Since then, he has worked at the local and state levels for health

departments in California, Georgia, and Louisiana. Ben completed his doctoral studies in epidemiology at Emory University's Rollins School of Public Health. In 2008, he joined CDC as an Epidemic Intelligence Service (EIS) Officer with the Respiratory Diseases Branch in NCIRD. After EIS, Ben served as a subject matter expert on listeriosis with the Enteric Diseases Epidemiology Branch in DFWEED. He is especially interested in invasive and bacterial diseases that affect vulnerable populations.

David Temporado was presented with the Associate Director for Laboratory Science (ADLS) Quarterly Award on February 19, 2014, for his extraordinary contributions to NCHHSTP and to DTBE's Laboratory Branch. He successfully orchestrated the move of over 93,000 isolates of *M. tuberculosis* from the genotyping contract laboratories to CDC.

For the past 10 years, DTBE has funded two contract laboratories, one in Michigan and one in California, to genotype one isolate of *M. tuberculosis* from each culture-confirmed case of TB. With the contracts expiring in September 2013, he made arrangements to purchase freezers for housing the isolates at CDC, and to transport the isolates from the contract laboratories to CDC. He coordinated the process, working closely with PGO, the CDC genotyping project officer, and the staff at the contract laboratories. This complex project consisted of acquiring equipment, specialized transport services, and replacement freezer racks. It also involved logistics to gain entry into the contract laboratories storing the isolates and coordination of personnel at each site to oversee the movement of the shipment. The arrangements took 9 months to complete, and the highly specialized delivery of 93,000 vials containing Biosafety Level 3 organisms maintained at -80°C arrived safely this January. These isolates are a valuable collection, as the genotyping information is linked to the surveillance data in the TB GIMS database, allowing for tracking of outbreaks and transmission of TB.

Mr. Temporado's extraordinary efforts as project coordinator, his commitment to the task, and his tenacious attention to detail are all greatly appreciated and resulted in a successful mission. Because of Mr. Temporado's devotion to his job and

the Laboratory Branch, Dr. Edwin Ades was pleased to give him the recognition he deserves.

The ADLS office recognizes NCHHSTP's laboratory scientists and staff by presenting the Quarterly NCHHSTP ADLS Recognition Award to an FTE, contractor, or fellow who has demonstrated outstanding work ethic and greatly contributed to the mission of his/her branch.

The Tuberculosis Surveillance Quality Assurance Training Team members are the worthy recipients of the DTBE Director's Quarterly Recognition Award for the second quarter of 2014. Members of the team are Lilia Manangan, Cheryl Tryon, Elvin Magee, Sandy Price, Stacey Parker, Robert Pratt, Kai Young, Juliana Grant, Angela Starks, Beverly Metchock, Glenda Newell, Lori Armstrong, Rachel Yelk Woodruff, Carla Jeffries, Alstead Forbes, Derrick Felix, Ann Lanner, Amera Khan, Smita Ghosh, and Roque Miramontes.

CDC's transition to a web-based surveillance system created a need for a standardized quality assurance (QA) process to govern the collection and reporting of high-quality TB data. QA of surveillance data is paramount to surveillance programs, but no current internal or external model existed to describe the QA process. The team developed the first comprehensive national QA training program for TB surveillance data in the U.S., which standardized methodologies, skills, and tools. The team's innovative efforts resulted in the development of the following:

- The QA process focuses on the five QA components, which are case detection, data accuracy, data completeness, data timeliness, and data security and confidentiality.
- The QA guide provides policies and procedures for conducting each of the QA components, as well as definitions, study questions, and examples of the QA tools.
- The QA toolkit includes approximately 50 QA tools (i.e., tables, charts, graphs, processes, and templates) that were developed by staff from CDC and various jurisdictions.

The QA training course focused on the QA process and five components. The course format included

presentations from faculty (DTBE subject matter experts) with interactive activities. Participants completed exercises to apply the content to realistic situations, shared experiences and answered questions, and described how they conduct QA in their own jurisdictions and overcome challenges.

Despite challenges imposed by various TB surveillance systems, economic constraints, and new diagnostic technologies, the team developed QA strategies with innovation and collaboration.

Congratulations to the Tuberculosis Surveillance Quality Assurance Training Team for this well-deserved honor.

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In Memoriam

Charles P. Felton, M.D., 87, of Palisades, NY, died January 16, 2014. Charles, or Chuck, was born May 6, 1926, in New Orleans, LA. He graduated from St. Augustine's Seminary in 1944, received a B.S. degree from Xavier University in 1949, and earned a Doctorate of Medicine from the University of Geneva, Switzerland, in 1956. He and Hiroko ("Susie") Felton married in 1958, building a home together in Palisades, NY, where they raised their three sons.

Chuck was an esteemed Clinical Professor Emeritus of Medicine at Columbia University's College of Physicians and Surgeons and Chief of Pulmonary Medicine at Harlem Hospital Center. He spent his career fighting TB in America's urban communities, Haiti, and beyond. He traveled extensively around the world, but loved most to spend time at home with family, gardening and cultivating his bonsai.

In lieu of flowers, the family is requesting that donations be made to the [American Lung Association](#) in New York or to the Charles P. Felton National Tuberculosis Clinic at Harlem Hospital Center.

John "Gus" Caras, 85, passed away on January 28, 2014, after a long battle with Alzheimer's Disease. Born in Greece on January 20, 1929, he came to the United States in 1947 at the age of 18. He served in the U.S. Army for 2 years at Fort Bragg in North Carolina. Following his military service, he attended

the Georgia Institute of Technology in Atlanta, where in 1958 he earned a bachelor's degree in Chemical Engineering and in 1967 earned a master's degree in Information and Computer Science.

He began his career as a chemist with Thiokol Corporation in Huntsville, Alabama, and also worked for the Army Missile Command designing rocket propellants. In 1966 he moved to Atlanta with his family and joined CDC's Division of TB Control, where he worked as a statistician for many years, retiring in 1992. He worked with Dr. Dixie Snider and later with Dr. Rick O'Brien. Among other things, Gus was a co-author with Dixie Snider and Don Kopanoff on the investigations related to INH hepatitis that are often cited.

Gus was very proud of his Greek heritage, and was a lifelong member of the Greek Orthodox Church. He enjoyed spending time with his grandchildren, traveling, and watching Georgia Tech football. In lieu of flowers, donations may be made to the Annunciation Greek Orthodox Cathedral, 2500 Clairmont Road, N.E.; Atlanta, GA 30329.

CALENDAR OF EVENTS

April 28–May 2, 2014

EIS Conference
Atlanta, GA
CDC

May 16–21, 2014

ATS International Conference
San Diego, CA
[American Thoracic Society](#)

June 1–4, 2014

APHL Annual Meeting and 8th Government
Environmental Laboratory Conference
Little Rock, AR
Association of Public Health Laboratories ([APHL](#))

June 3–4, 2014

ACET Face-to-face Meeting
Atlanta, GA
Margie Scott-Cseh

Sept. 7–9, 2014

American College of Epidemiology (ACE) Meeting
Silver Spring, MD
[American College of Epidemiology](#)

Sept. 16–18, 2014

TB Education and Training Network (TB ETN)
Conference
Atlanta, GA
Peri Hopkins

Oct. 28–Nov. 1, 2014

45th Union World Conference on Lung Health
Barcelona, Spain
[International Union Against Tuberculosis and Lung Disease](#)

Nov. 15–19, 2014

142nd APHA Annual Meeting
New Orleans, LA
[American Public Health Association \(APHA\)](#)