

**“Good Tuberculosis Men”:
The Army Medical Department’s
Struggle with Tuberculosis**

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Department’s Struggle
with Tuberculosis**

Carol R. Byerly

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Foreword

During the past 239 years, our fighting forces have been stopped more often by diseases such as smallpox, cholera, and malaria than by enemy bullets. Our lessons learned in fighting these diseases have never been more important than they are today, because the health and resilience of our men and women in uniform have never been a greater matter of national security. Throughout history, the Army Medical Department has used our past experiences to strengthen our capacity and our resolve as a healthcare organization to support and sustain the Army, enhance the care experience, and innovate Army Medicine.

Tuberculosis is one of the diseases that have incapacitated our fighting forces in the past. “*Good Tuberculosis Men: The Army Medical Department’s Struggle With Tuberculosis*” details the history of the Army’s battle with this disease. Carol R. Byerly’s extensively researched and insightful publication highlights the adaptability, tenacity, and resourcefulness of Army Medicine in overcoming challenging obstacles in the past.

Early Army tuberculosis programs proved to be effective; tuberculosis dropped from first place among reasons for federal disability discharges after World War I to 13th place after World War II. By the 1960s, tuberculosis became a curable and controllable disease. The US Army Medical Department—as with many infectious diseases—was a leader in the global efforts to contain, control, and cure this disease.

While the prevalence of tuberculosis has decreased dramatically in the Western world, it is still common in other parts of the world where nearly two million people die each year from tuberculosis, and one-third of the world’s population is infected. As a result, tuberculosis is a serious threat to our fighting capabilities should American fighting men and women deploy to areas where this disease is still endemic.

Our military will continue to deploy, and by necessity our practitioners will have to treat our service members, the local populations, and enemy combatants infected with tuberculosis. Multidrug-resistant tuberculosis and extensively drug-

resistant tuberculosis continue as serious concerns today in diabetic patients, immunocompromised patients, and those who have failed to complete previous courses of therapy.

The battle against tuberculosis is not over. We will continue the fight and be prepared to provide the best preventive and postinfection care against tuberculosis possible.

I thank Carol R. Byerly for this important contribution to the literature and for helping us to ensure our fighting forces are ready and resilient.

Serving to Heal...Honored to Serve!

Patricia D. Horoho
Lieutenant General, US Army
The Surgeon General and
Commanding General, US Army Medical Command

Introduction

In 1917, as the United States prepared for war in Europe, Army Surgeon General William C. Gorgas recognized the threat of *Mycobacterium tuberculosis* to American troops and recruited one of the nation's top tuberculosis specialists, Colonel George E. Bushnell, to help. Bushnell was a brilliant, skilled, compassionate medical officer, committed to public health and given ample government funding. He developed a nationwide program to keep tubercular men out of the U.S. Army and to identify and isolate active cases of tuberculosis in the ranks in a timely and effective manner. The disease was difficult to detect, especially in its early stages, so Bushnell was not surprised when trainees and soldiers began to appear in Army camp hospitals with signs of tuberculosis. He was, however, disturbed to learn in early 1918 that hundreds of American doughboys were coming home from Europe *erroneously* diagnosed with tuberculosis. False diagnoses wasted manpower and resources and needlessly alarmed soldiers and their families. What the Army needed, wrote Bushnell, were some "good tuberculosis men." Experts deployed with the American Expeditionary Forces in France could reduce the false-positive diagnosis rates "over there."¹ Bushnell stepped up his recruiting and training of tuberculosis specialists, designated several tuberculosis centers in France to evaluate soldiers with suspected disease, and established a system of tuberculosis hospitals in the United States to care for the sick. These steps dramatically reduced the false diagnoses. Still, despite the efforts of the nation's best "tuberculosis men," the disease would become a leading cause of World War I disability discharges and veterans benefits.

The problem was both biomedical and political. Tuberculosis was a wily foe, and medical scientists and physicians at the time lacked the knowledge to accurately diagnose or effectively treat it. Tuberculosis bacteria could lie latent in a person's body for years but then exploit a weakened immune system and break into active disease, spreading within the host's body and infecting others. Sir Arthur

S. McNalty, chief medical officer of the British Ministry of Health (1935–40), called tuberculosis “one of the camp followers of war.” War abetted tuberculosis, he explained, because of the “lowering of bodily resistance and increased physical or mental strain or both,...combined with increased opportunities for contact infection from one person to another.”² Active tuberculosis could also recede in many patients, succumbing to their immune systems once again, becoming undetectable, but then reactivating years later. This pattern made it difficult for government officials to keep infected men out of the Army, and if individuals developed tuberculosis later, it was often impossible to determine whether they had contracted it during military service or in civilian life. Moreover, the fact that tuberculosis patients often experienced cycles in which they recovered their health and then fell ill again over several months or years challenged government officials to judge the degree to which a person was disabled and required government care and support. Federal policies concerning tuberculosis would, therefore, confound the U.S. Army Medical Department during much of the twentieth century.

Tuberculosis in the Army

This book tracks the impact of tuberculosis on the U.S. Army from the late 1890s, when it was a ubiquitous presence in society, to the 1960s when it became a curable and controllable disease.³ The Army experience with the disease is both similar to and different from the broader civilian story of tuberculosis, but the historical literature has paid little attention to it.⁴ The evolution of tuberculosis treatments—from the nineteenth-century approach of fresh air and exercise, to rest therapy, to surgical intervention, and finally to antibiotics—was similar in both military and civilian institutions. Many of the important players were the same, too, as civilian physicians and nurses joined the military in wartime and then returned to civilian life afterward. Tuberculosis hospitals also shifted between civilian and military status, providing the military increased capacity during the war years, and then converting back to civilian management in peacetime. As tuberculosis rates slowly declined after 1900, medical strategies against the disease moved from defense to offense—from simply caring for the sick, to isolating and treating patients with tuberculosis, to surveilling military personnel and civilian populations to find, isolate, and treat active cases, and finally to curing the disease. This process was generally more rapid and thorough in military institutions than in civil society.

The military and civilian tuberculosis experience also differed, however, beginning with the fact that military populations were particularly vulnerable to tuberculosis because the disease favored young adults, the age group comprising the bulk of the Army. But as a relatively closed institution, the Army could more easily exclude the disease from its ranks than could civilian communities,

screening its personnel for infections and treating them with greater and more uniform control. The federal government was also obliged to treat military patients, who therefore often—but not always—received some of the best tuberculosis treatment available in the country, if not the world.

The story of the Army Medical Department's struggle with tuberculosis describes the experiences of thousands of active duty personnel and veterans who spent years as patients in the Army's tuberculosis hospitals, and of the medical officers, nurses, and enlisted personnel who cared for them, often at the risk of their own health. It also brings to light individuals who have been largely obscured in more general histories of military medicine.⁵ George E. Bushnell in the early 1900s and World War I, Earl H. Bruns in the 1920s and 1930s, Esmond R. Long in World War II and its aftermath, and Carl W. Tempel and James H. Forsee in the 1940s and 1950s all made important contributions to tuberculosis research, education, and treatment, as well as crafting and executing Army policies and practices. But just as many Americans have forgotten about the scourge of tuberculosis, historians, too, have forgotten these men's accomplishments.

This book examines the history of tuberculosis in the Army through four, interrelated themes regarding government policies and institutions, disease transmission, and the patient experience. The first follows the Army Medical Department's management of tuberculosis and the often uneven, sometimes ragged development of federal policies regarding military personnel and veterans with the disease. Once laboratories could identify tuberculosis in the 1880s, government officials began to devise targeted policies regarding the employment, treatment, and disposition of military personnel who were positively diagnosed. But just as the tools of detection and knowledge about tuberculosis evolved haltingly, so too did policies governing the treatment of tubercular soldiers, sailors, Marines, military nurses, and veterans.

The second theme tracks the Medical Department's efforts to establish and maintain tuberculosis hospitals and services to meet the needs of the military and the nation, and shows that its physicians and institutions were often leaders in tuberculosis research and treatment. The Army's program began with a small, insular community of tuberculars on a high plateau at Fort Bayard, New Mexico, serving the equally small and isolated Army of the early 1900s. Over the decades the program evolved into a nationwide network of government tuberculosis hospitals, which in the 1940s included a bustling military post of 10,000 in Denver, Colorado. During World War II, the Army tuberculosis program spanned the globe, as its hospitals and personnel cared for American prisoners of war (POW) and refugees in Europe and Asia, as well as for German, Italian, and Japanese POWs held in the United States. Tuberculosis hospitals also rode the national economy, booming in wartime, and almost "going bust" during the Great Depression. Questions of whether and when to terminate tuberculosis institutions and services involved

both medical and political decisions, and engaged municipal, state, and federal governments, soldiers, veterans and their families, and, of course, the press.

This book’s third theme explores the interaction between biology and society—how the evolution of scientific and patient understanding of tuberculosis transmission shaped patient and healthcare worker behavior, medical practice, and government policies. During much of the twentieth century, military and civilian medical personnel alike believed that contagious tubercular material was confined to patients’ sputum and other excreta, and that careful disposal of that material and good patient hygiene could prevent transmission to other people. In fact, however, tuberculosis is largely spread by tiny airborne particles (droplet nuclei) expelled by a person with infectious tuberculosis while coughing, sneezing, talking, or even simply breathing. These droplet nuclei can remain suspended in the air for minutes or even hours, depending on the ambient ventilation, so an uninfected individual does not have to have direct contact with someone or their bodily fluids to become infected. Sources of tuberculosis contagion are also difficult to track because active tuberculosis does not demonstrate the dramatic, explosive contagion seen with diseases such as influenza or measles. Medical scientists and public health officials therefore did not fully understand and agree on the nature of airborne tuberculosis transmission until convincing scientific evidence emerged in the 1950s. As a result, they unwittingly exposed generations of caregivers, family members, and the general public to tuberculosis infection.

The fourth and final theme of this book examines the tuberculosis experience from the perspective of the military patients and the medical personnel who cared for them.⁶ For several decades in this story, medical personnel were often both caregivers and patients. While this could increase their credibility as experts and healers, it also left some of them dead or disabled and vulnerable to disease recurrence. The evolution of tuberculosis treatment from fresh air and exercise to antibiotic therapy shaped and reshaped the tuberculosis experience, including the patients’ interactions with medical institutions and staff and their discomfort, anxiety, hope, and fear. Rich archival sources including medical records and patient correspondence reveal the daily experience of tuberculosis and also underscore that tuberculosis often cruelly took young adults in the prime of life.

“Good Tuberculosis Men” explores these themes—tuberculosis policy, institutions, transmission, and the disease experience—over nine chapters in largely chronological order. The first third of the book examines the Army’s first tuberculosis hospital established in 1899 at Fort Bayard in the mountains of New Mexico. Chapter 1, “The Early Years,” describes the Medical Department’s early efforts to find the right leadership and regime for the institution. In such an isolated community of active-duty soldiers, sailors, Marines, and veterans of the Indian and the Spanish-American wars, post commanders often struggled as much with poor patient and troop morale and discipline as with tuberculosis itself. The second

chapter, “Life at Fort Bayard,” explores the more stable and therapeutic world created by Colonel (Col.) Bushnell, who commanded the hospital from 1907 to 1917. Bushnell employed his authority both as a physician and as an Army officer to establish rigorous yet compassionate policies governing the benefits, rights, and responsibilities of tuberculosis patients and staff. His efforts transformed Fort Bayard into a model tuberculosis sanatorium that became a training school for both civilian and military tuberculosis specialists. For many patients the hospital also provided a seamless transition from active-duty to veteran status in the era before the nation had a separate hospital system for veterans. The third chapter, “The Congressman as Tuberculosis Patient,” contributes to the scholarship on tuberculosis patients’ struggles with the meaning of their disease by providing an intimate view of Fort Bayard life through the letters of Congressman George Legare of South Carolina.⁷ His daily letters to his wife while he was a patient in 1908 and 1909 show a politician at the peak of his powers as an elected official and the *pater familias* of his extended clan, struggling with the consequences of his disabling disease.

World War I transformed the Army Medical Department’s tuberculosis program, and the next two chapters examine that process. Chapter 4, “Tuberculosis in World War I,” describes Bushnell’s wartime efforts to contain tuberculosis cases and costs as thousands of tuberculosis patients flooded Army hospitals. The dramatic influx compromised care and put some hospitals and their patients at risk, but it also led to the establishment of the Army’s largest and most important tuberculosis hospital, Fitzsimons General Hospital, in Denver, Colorado. Constructed in the final months of the war, Fitzsimons admitted patients before it was completed and fully prepared, which led to patient complaints, press exposés, and a congressional investigation before the hospital was a year old. Chapter 5, “‘A Gigantic Task’: Treating and Paying for Tuberculosis in the Interwar Period,” examines the postwar impact of tuberculosis on government institutions and resources. As Congress extended benefits to more and more veterans in the 1920s, negotiations as to which veterans would get what benefits and for how long involved numerous federal agencies, medical specialists, interest groups, and military personnel and their families. The chapter also shows how and why the cost of tuberculosis treatment required longer hospital stays and became increasingly expensive after the war, examining Col. Earl H. Bruns’ work at Fitzsimons on new tuberculosis therapies such as rehabilitation and surgery.

Invasive procedures that probed tuberculosis material also increased the risk of infection to medical personnel, especially nurses who cared for the sickest patients on a daily basis. Chapter 6, “Good Tuberculosis Women,” examines tuberculosis nursing and the imperfect and evolving understanding of tuberculosis transmissibility during the interwar period. Despite evidence that tuberculosis nurses had higher rates of infection than other medical personnel, until a strong

consensus on airborne transmission finally emerged in the late 1950s, many institutions were reluctant to impose time-consuming and costly protective measures. The result was that countless nurses and nursing students contracted the disease from their patients.

Chapter 7, “Surviving the Great Depression,” shows how federal tuberculosis policy became the object of political controversy during the contraction of the Great Depression when Army Surgeon General Robert U. Patterson, required to make draconian budget cuts, tried to close down Fitzsimons Hospital in 1933. He ran into energetic and politically adept opposition from Congressman Lawrence Lewis, Denver’s representative in Washington. With Lewis’ detailed diary as a guide, the chapter traces his efforts to save the hospital using every political lever available, from medical opinion and patients’ pleas to New Deal funds and intervention by President Franklin Roosevelt.

By the time the United States entered World War II, tuberculosis was but a minor threat to military operations, but the disease nevertheless continued to elude detection in the ranks; indeed, just one case could endanger an entire unit. Tuberculosis also exploited the most desperate conditions of the war—Nazi concentration camps, German and Japanese POW camps, and war-torn Europe. This time, the Army’s tuberculosis expert was a civilian, Esmond Long of the Henry Phipps Institute of Philadelphia, Pennsylvania, who was commissioned as a colonel in the Medical Corps to fight tuberculosis in the Army. Chapter 8, “Camp Follower,” tracks Long’s various wartime activities and policies that successfully demoted tuberculosis from first place after World War I to thirteenth place as the cause of federal disability discharges. The ninth and final chapter, “Miracle Drugs?” describes how tuberculosis was finally brought under control with the development of antibiotic treatments in the 1940s and 1950s. The remedy did not involve a single “miracle drug,” but rather a complicated antibiotic regime that still requires months to complete and contends with the continuous development of drug-resistant strains of bacteria. But years of research, trial, and error finally did produce a cure—and some of the important clinical trials were conducted at Army hospitals. Fitzsimons medical officers Cols. Carl Tempel and James Forsee were in the forefront of research on how to employ antibiotics to finally cure tuberculosis patients. Chapter 9 also tells the story of Margaret Gaule, an Army nurse and veteran of World War II, whose tuberculosis experience reveals how the struggle over fair and reasonable policies regarding tuberculosis in the military continues to this day.

Tuberculosis in Brief

An important character in this story is tuberculosis itself, which, in 1905, famed physician Sir William Osler labeled “the most universal scourge of the human race.”⁸ This book spans the often excruciating period in the history of

tuberculosis (and in the history of medicine generally), from the 1890s to the 1950s, during which time physicians could *diagnose* tuberculosis but could neither *cure* it nor even *treat* it effectively.⁹ Tuberculosis has plagued societies for millennia, and continues to thrive today. Archeological evidence of tuberculosis in humans dates back to prehistoric times, and in antiquity Hippocrates accurately described the disease then known as consumption. Though eclipsed by plague, leprosy, and other deadly diseases during the Middle Ages, tuberculosis steadily took its toll. When the early anatomists began to systematically study cadavers in the sixteenth and seventeenth centuries, they regularly found signs of tuberculosis in the bodies they opened. The development of the stethoscope and the art of percussion (tapping the chest and the upper back to learn the conditions of the lungs) in the late eighteenth century enabled physicians to better detect and describe tuberculosis in the living. Soon, there was more of it to describe: the disease surged in the poverty and crowded living conditions of the increasingly industrialized and urbanized societies to become the leading killer in Western Europe and the United States in the nineteenth century.

When the German scientist Robert Koch identified tuberculosis bacilli in 1882, he finally found the cause of all of the suffering. Reproducing tuberculosis by injecting the bacteria into guinea pigs, Koch also articulated germ theory—that a specific pathogen produced a specific disease—and accelerated the development of modern medicine. But unlike diseases such as diphtheria, typhoid, and tetanus, which quickly succumbed to vaccines and antitoxins, tuberculosis resisted control. Tuberculosis rates did decline in many industrialized nations throughout the twentieth century even before the antibiotic cures of the 1940s and 1950s due to improved standards of living and the isolation of many tuberculosis patients. Rates in the United States (Figure 1) fell from almost 200 deaths per 100,000 people in 1900 to around five deaths per 100,000 in 1955¹⁰. Similarly, in the Army tuberculosis declined from being the leading cause of disability discharges in the early 1900s to a rare occurrence by the latter half of the century. As one sign of increased control, in 1975, officials began to track *new cases* of tuberculosis rather than tuberculosis *deaths*. They found that new tuberculosis case rates in the country fell at a fairly steady rate of 5 to 6 percent annually during the second half of the twentieth century, from 52.6 per 100,000 per year in 1953 to 9.4 per 100,000 per year in 1984. Such dramatic decreases in the United States and other industrialized countries bred complacency on the part of many public health agencies. This complacency exploded in the 1980s when a mysterious new infection, the human immunodeficiency virus (HIV, the precursor to acquired immunodeficiency syndrome or AIDS), weakened people's immune systems enabling latent tuberculosis infections to become active and deadly, causing the first *increase* in tuberculosis rates in decades. New case rates increased from 9.2 per 100,000 in 1988 to 10.4 per 100,000 in 1991. Initially caught off guard, public

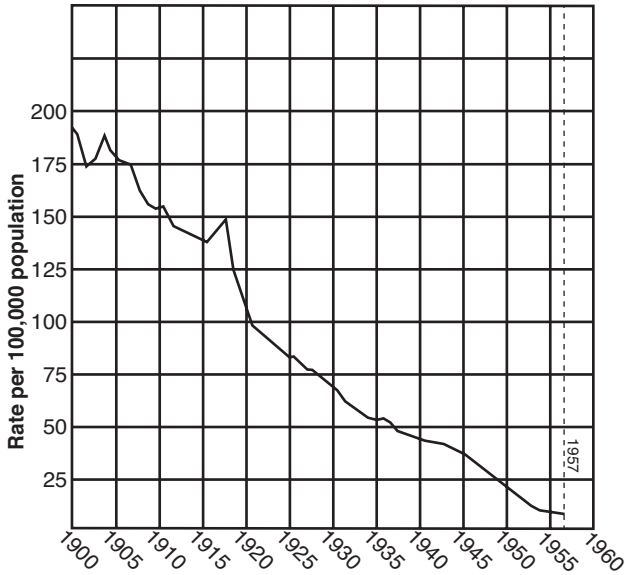


Figure 1. Chart showing the decrease in the tuberculosis death rates in the United States, 1900–57, in the civilian population.

Reproduced with permission from the *American Journal of Public Health* 48 (1958): 1440. Image available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1551815/pdf/amjphnation01081-0004.pdf>.

health officials were able to reverse the trend. By 2008, the United States recorded 4.2 new cases of tuberculosis among 100,000.¹¹

Tuberculosis has continued to flourish in other regions of the world, and today about one-third of the world's population—more than two billion people—is infected with the bacterium. Almost two million die every year.¹² The stresses of poverty, malnutrition, malaria, and HIV-AIDS suppress people's immune systems, allowing latent tuberculosis infections to flare across the world, including regions where Americans travel or the U.S. Army deploys. A deadly combination called TB-HIV (the co-infection of tuberculosis and HIV) is now ravaging a number of developing countries and threatens to become one of the biggest killers of the twenty-first century. Tuberculosis is a leading cause of sickness and death among people living with HIV because HIV compromises a person's immune system and can allow a latent tuberculosis infection to become active and fatal. Equally troubling, strains of *Mycobacterium tuberculosis* are developing resistance to life-saving antibiotic agents.¹³ Multidrug-resistant tuberculosis (MDR-TB) bacteria are resistant to at least two of the best, first-line tuberculosis drugs. Extensively drug-resistant tuberculosis (XDR-TB) bacteria are resistant to the first line-drugs and at least two second-line drugs.¹⁴ Treatment of MDR-TB and XDR-TB

now involves long and expensive regimes of some 20 pills a day for two years. Some XDR-TB patients are virtually incurable, forcing physicians to return to tuberculosis medicine of the preantibiotic era resorting to bed rest and surgical removal of infected tissue.¹⁵

Tuberculosis defies definitive understanding to this day. Some cases continue to elude diagnosis and there is still no reliable, completely effective vaccine. Through the years the Army Medical Department has grasped all available tools to prevent and treat the disease, an effort that has challenged the intellectual and emotional resources of generations of medical personnel. Those challenges are particular to tuberculosis because of the unique etiology of tuberculosis, the human immune response to the bacteria, the difficulty diagnosing and treating the disease, and the politically sensitive and financially costly problem of treating military patients.

Etiology

Tuberculosis can develop in almost any part or organ of the body, but the great majority of cases are pulmonary, perhaps because the bacteria thrive in oxygen-rich environments. The other “extrapulmonary” cases include tuberculosis of the lymphatic system (once known as “scrofula”), tuberculosis of the spine (Pott’s Disease), tuberculosis of the skin (including *lupus vulgaris*), and tuberculosis of the bones and joints or one or more vital organs. In most cases of initial infection, the body’s general defenses can prevent active tuberculosis disease by walling off the invading bacteria and producing a calcified lesion in the lungs or elsewhere, so that a person may never know he or she has been infected. Only about 10 percent of people infected with *Mycobacterium tuberculosis* will go on to develop an active form of the disease. For that unfortunate minority, the immune response is inadequate or fails, and the bacteria multiply, destroying tissue and producing moist lesions or “spots” on the lungs. These areas can infiltrate lung tissues, causing “caseation,” which gives a cheese-like texture to the lungs, and then progress to cavitation, or the erosion of the lung tissue that is coughed up in bloody or purulent sputum. Patients’ symptoms can include a prolonged cough, fevers, night sweats, weight loss, fatigue, and lung hemorrhages (which can occur when tuberculosis bacteria rupture blood vessels in the lungs). Human lungs have three lobes on the right and two lobes on the left, and cavitation of a lobe can cause a displacement of the heart and coronary disease. Patients can also develop secondary tubercular infections in the larynx from coughing up bacteria, or gastrointestinal tuberculosis from swallowing tubercular matter. The progression of the disease is usually slow — over months and years — but can also be rapid, killing patients, especially children, in a matter of weeks. Some forms of tuberculosis are

especially lethal, such as miliary tuberculosis, in which tuberculosis bacteria are released into the bloodstream, or meninginal tuberculosis, which infects the spinal fluid. Tuberculosis patients can die of blood loss, sepsis, pneumonia, lung or heart failure, or the failure of other organs. During the time frame covered in this book, 1899 to 1960, some Army Medical Department patients did recover completely and lived to die of other causes. The majority of soldiers, sailors, Marines, and veterans with tuberculosis, however, experienced years of impaired health, with cycles of recovery and relapse until they succumbed to the disease.

Transmission

The evolving contemporary understanding of tuberculosis transmission is key to this story because it informed tuberculosis policies ranging from patient admission and discharge rules, to medical and nursing protocols, and hospital architecture. That tuberculosis bacteria can be transmitted through the air did not become a consensus view until experiments with guinea pigs in the 1950s presented irrefutable evidence.¹⁷ Only then did hospitals and medical personnel universally adopt precautionary procedures such as isolating patients in negative air pressure rooms to ensure that tuberculosis bacteria did not escape to the rest of the hospital; requiring healthcare workers to wear gowns, gloves, and masks or respirators when caring for patients; and monitoring staff with annual tuberculin tests and chest X-rays to catch new infections. Until this understanding, however, caregivers were repeatedly exposed to infection, and tuberculosis patients, including soldiers and veterans, often moved freely about the country, spreading disease to their families, friends, and communities.

Immunity

Some people who are repeatedly exposed to tuberculosis bacteria will never develop the disease and are presumably immune to it. Others, especially children, may succumb rapidly, their bodies' immune systems unable to wall off the bacteria. This is not the place for a discussion of the human immune response to tuberculosis—it is so technical and complex that even an article on the immune system in the *New England Journal of Medicine* for medical professionals had a glossary to assist readers.¹⁹ But the unpredictability of immune responses and the bacteria's susceptibility to changes in the environment made it difficult for the Army Medical Department to develop clear and fair policies regarding benefits, treatment, eligibility, and even military assignments for tuberculosis patients. Military training, combat, or time spent as a POW could weaken soldiers' immune systems. In peacetime, service in the tropics could also be risky if military personnel

or their families became ill with malaria, dysentery, sexually transmitted diseases, or anything else that could compromise their immune systems and give a latent tuberculosis infection the opportunity to become active.

Diagnosis

Tuberculosis diagnosis remains as much an art as a science, and an infection can still be mistaken for other diseases of the lungs or chest. As with most diseases, the earlier it is discovered the better the patient's chances of recovery. By the time tubercular people have physical symptoms such as a chronic cough, fever, weight loss, and the most telltale sign of all—lung hemorrhage or spitting up blood—they are seriously ill. Military physicians therefore eagerly adopted the microscope to identify tuberculosis bacteria and X-ray technology to detect lesions and cavities in the lungs or other organs. They also quickly learned to track the regression or progression of the disease over time. Despite diagnostic tools that today include blood tests and genetic analysis, tuberculosis detection is still imperfect and medical professionals continue to debate the usefulness of various diagnostic technologies.²⁰

Treatment

Tuberculosis bacteria grow slowly and have a waxy coating on the cell surface, which enabled them to elude effective treatment or “magic bullets” until the development of antibiotic regimes in the 1940s and 1950s. The progression of tuberculosis therapies evolved from fresh air and exercise and various medicinal and chemical concoctions of the nineteenth century, to twentieth-century treatments including extended bed rest, a nutritious diet, exposure to the sun, lung collapse procedures, and surgery—all of which had debatable degrees of success. During the second half of the twentieth century antibiotics enabled many countries to cure thousands of patients and dramatically reduce their tuberculosis rates. But because tuberculosis rates were falling steadily decades before antibiotics, historians and scientists have debated the historical significance of various antituberculosis measures in reducing tuberculosis morbidity and mortality rates during the twentieth century, including:

- natural selection whereby tuberculosis survivors have produced more resistant progeny and/or tuberculosis bacteria have decreased in virulence;
- improved standards-of-living such as less crowded housing, better ventilation, and better diets, reducing chances of transmission and improving people's ability to resist disease;

- public health measures such as milk pasteurization, the isolation of tuberculosis patients in sanatoriums, and the surveillance of specific populations to identify and isolate disease carriers; and
- medical interventions such as rest therapy, lung collapse and the surgical removal of diseased tissue, vaccines, and antibiotics.²¹

The slow yet steady decline of tuberculosis in the United States suggests that the confluence of all of these factors was required to weaken this powerful adversary. It would be unwise, however, to declare victory. Physician and historian Barron Lerner points out that tuberculosis has remained a major health problem, particularly in poor urban communities, and another physician and historian, Howard Markel, states, “We must accept that we will never completely conquer tuberculosis.... The best we can hope for is to contain it enough to limit its influence.”²²

Disposition

The issue of “disposition,” or what to do with both civilian and military tuberculosis patients once their treatment has been completed, has been one of the most vexing and politically sensitive issues the Army Medical Department has faced. Some patients recovered from the disease enough to return to duty, as many wanted to, especially officers and enlisted men who had planned on a military career. But some government officials questioned whether former tuberculosis patients would be able to perform their duties satisfactorily and whether they would infect others with the disease. Patients too disabled to return to duty also posed serious questions. Who should pay for their care? How long must the soldiers serve in the military before the government was responsible for their care? How long should treatment be provided? When were veterans and military patients well enough to go home? Did they pose a risk to themselves and to others? What about soldiers who wanted to go home to die? These issues would be heatedly debated in the War Department, Congress, and American society. Peoples’ lives and livelihoods depended on the answers.

Throughout its history, the U.S. Army—like the rest of society—has had to contend with a complex, resilient, and deadly disease in its ranks. The emergence of germ theory in the late nineteenth century and successful identification of tuberculosis bacteria finally enabled public health officials to move against the disease, but it still defeated the brightest and most vigorous of its adversaries—“good tuberculosis men” like Col. George Bushnell and other medical officers who served with him and after him. In 1899, as the nineteenth century waned and the United States gained international power and responsibilities, the Army Medical Department took its first and perhaps most important step when it established its

first tuberculosis hospital in the mountains of New Mexican Territory. Here, in the American wilderness, medical officers would enlist new scientific knowledge against an ancient foe.

Notes

1. G. E. Bushnell to G. B. Webb, 7 August 1918, Record Group [hereafter cited as RG] 112, Entry 29, Gen., 1917-27, Box 396, National Archives and Records Administration [hereafter cited as NARA].

2. Arthur S. McNalty, "Tuberculosis in Peace and War," *Tubercle* 23 (1942): 266.

3. Because the vast majority of people with tuberculosis in the Army and elsewhere—about 90 percent—had tuberculosis of the lungs, all references to "tuberculosis" will mean pulmonary tuberculosis unless otherwise stated.

4. Studies of tuberculosis in the United States include Barbara Bates, *Bargaining for Life: A Social History of Tuberculosis, 1876-1938* (Philadelphia, PA: University of Pennsylvania Press, 1992); Sheila Rothman, *Living in the Shadow of Death: Tuberculosis and the Social Experience of Illness in American History* (New York, NY: Basic Books, 1994); Georgina D. Feldberg, *Disease and Class: Tuberculosis and the Shaping of Modern North American Society* (New Brunswick, NJ: Rutgers University Press, 1995); Katherine Ott, *Fevered Lives: Tuberculosis in American Culture since 1870* (Cambridge, MA: Harvard University Press, 1996); Barron H. Lerner, *Contagion and Confinement: Controlling Tuberculosis Along Skid Row* (Baltimore, MD: Johns Hopkins University Press, 1998); Emily K. Abel, *Suffering in the Land of Sunshine: A Los Angeles Illness Narrative* (New Brunswick, NJ: Rutgers University Press, 2006); Emily K. Abel, *Tuberculosis and the Politics of Exclusion: A History of Public Health and Migration to Los Angeles* (New Brunswick, NJ: Rutgers University Press, 2007); and Cynthia A. Connolly, *Saving Sickly Children: The Tuberculosis Preventorium in American Life, 1908-1970* (New Brunswick, NJ: Rutgers University Press, 2008).

General histories include Thomas Dormandy, *The White Death: A History of Tuberculosis* (New York, NY: New York University Press, 1999); Flurin Condrau and Michael Worboys, *Tuberculosis Then and Now: Perspectives on the History of an Infectious Disease* (Montreal and Kingston: McGill-Queens University Press, 2010); and the classic Rene and Jean Dubos, *The White Plague: Tuberculosis, Man, and Society* (New Brunswick, NJ: Rutgers University Press, 1952, 1987).

5. Examples of works that give short shrift to tuberculosis and Army tuberculosis specialists include Mary C. Gillett, *The Army Medical Department, 1865-1917* (Washington, DC: Center of Military History, 1995); Percy M. Ashburn, *A History of the Medical Department of the U.S. Army* (Boston, MA and New York, NY: Houghton Mifflin, Co., 1929); Richard V. N. Ginn, *The History of the U.S. Army Medical Service Corps* (Washington, DC: Office of the Surgeon General and Center of Military History, 1997); and Clarence McKittrick Smith, *The Medical Department: Hospitalization and Evacuation, Zone of Interior*

(Washington, DC: Office of the Chief of Military History, Department of the Army, 1956).

6. Memoirs include Betty MacDonald, *The Plague and I* (Philadelphia, PA: J. B. Lippincott, 1948); Robert G. Lovell, *Taking the Cure: The Patient's Approach to Tuberculosis* (New York, NY: MacMillan 1948); Will Ross, *I Wanted to Live* (Milwaukee, WI: Wisconsin Anti-Tuberculosis Association, 1953); Elizabeth Mooney, *In the Shadow of the White Plague* (New York, NY: Thomas Y. Crowell, 1979); and Dorothy Simpson Beimer, *Hovels, Haciendas, and House Calls: The Life of Carl H. Gellenthien, M. D.* (Santa Fe, NM: Sunstone Press, 1986).

Novels about the tuberculosis experience include Thomas Mann's iconic *The Magic Mountain*, 1924, various editions; Julian Green, *The Closed Garden* (New York, NY: Harper and Brothers, 1928); A. E. Ellis, *The Rack* (London, UK: Penguin Books, 1958, 1961); Donald Stewart, *Sanatorium* (New York, NY: Harper and Brothers Publishers, 1930); and Eamonn McGrath, *The Charnel House* (Belfast, UK: Blackstaff Press, 1990).

7. See, for example, Rothman, *Living in the Shadow of Death*; Bates, *Bargaining for Life*; Ott, *Fevered Lives*; Abel, *Suffering in the Land of Sunshine*; and Carolyn June McQuien, "Tuberculosis as Chronic Illness in the United States: Understanding, Treating, and Living with the Disease," Ph.D. dissertation, University of Texas at Austin, 1993. Thomas Mann also explores these issues with Hans Castorp in *Magic Mountain*.

On the importance of examining the patient experience see Roy Porter, "A Patient's View: Doing Medical History from Below," *Theory and Society* (1985): 175–98. Also on the patient experience, see Arthur Kleinman, *The Illness Narratives: Suffering, Healing, and the Human Condition* (New York, NY: Basic Books, 1988); Chris Feudtner, *Bittersweet: Diabetes, Insulin, and the Transformation of Illness* (Chapel Hill, NC: University of North Carolina Press, 2003); Robert A. Aronowitz, *Making Sense of Illness: Science, Society, and Disease* (New York, NY: Cambridge University Press, 1998); Ray Fitzpatrick, John Hinton, Stanton Newman, Graham Scambler, and James Thompson, *The Experiences of Illness* (London, UK: Tavistock Publications, 1984); and Kathy Charmaz, *Good Days, Bad Days: The Self in Chronic Illness and Time* (New Brunswick, NJ: Rutgers University Press, 1991).

8. William Osler, *The Principles and Practice of Medicine*, 4th ed. (New York, NY: Appleton and Company, 1905), 284.

9. On the medical and scientific nature of tuberculosis, see Michael D. Iseman, *A Clinician's Guide to Tuberculosis* (Philadelphia, PA: Lippincott Williams & Wilkins, 2000); also Dormandy, *The White Death*; J. Arthur Myers, *Tuberculosis: A Half Century of Study and Conquest* (St. Louis, MO: Warren H. Green, Inc., 1970); and Lawrence Geiter, *Ending Neglect: The Elimination of Tuberculosis in the United States*, National Academy Press, Committee on the Elimination of Tuberculosis in the United States, Division of Health Promotion and Disease Prevention, Institute of Medicine (Washington, DC: Government Printing Office, 2000).

10. Geitner, *Ending Neglect*, 28.

11. Centers for Disease Control, "Morbidity Trend Tables, United States, at http://www.cdc.gov/TB/statistics/reports/2008/pdf/4_MorbTrend.pdf, accessed 26 October 2012.

12. Tuberculosis has been specifically targeted by the World Health Organization, see the Web site <http://www.stoptb.org/>, accessed 26 October 2012. See also the CDC Web site, <http://www.cdc.gov/tb/topic/drtb/xdrtb.htm>, accessed 26 October 2012; John D. H. Porter and John M. Grange, eds., *Tuberculosis: An Interdisciplinary Perspective* (London, UK: Imperial College Press, 1998); Charles W. Schmidt, "Linking TB in the Environment: An Overlooked Mitigation Strategy," *Environmental Health Perspectives* 11 (November 2008): A479–85; Kent A. Sepkowitz, "Tuberculosis and the Health-Care Worker: A Historical Perspective," *Annals of Internal Medicine* 120 (January 1994): 71–79; and "Some Ne-

glected Diseases Are More Neglected Than Others," *Science* 323 (6 February 2009): 700.

13. Matthew Gandy and Alimuddin Zumla, eds. *The Return of the White Plague: Global Poverty and the 'New' Tuberculosis* (London, UK: Verso, 2003).

14. WHO Web site, "Tuberculosis and HIV," <http://www.who.int/hiv/topics/tb/en/>, accessed 26 October 2012; and CDC Web site, <http://www.cdc.gov/tb/topic/drtb/xdrtb.htm>.

15. Just one example is Sohaila Mohsin Ali, Abdul Aziz Siddiqui, and Joseph S. McLaughlin, "Open Drainage of Massive Tuberculous Empyema with Progressive Re-Expansion of the Lung: An Old Concept Revisited," *Annals of Thoracic Surgery* 62 (1996): 218–24. See also Gwen Huitt, "MDR-TB," in the Denver TB Course, National Jewish Medical and Research Center," 26–29 April 2006; J. A. Caminero, "Treatment of Multidrug-Resistant Tuberculosis: Evidence and Controversies," *International Journal of Tuberculosis and Lung Disease* 10 (2006): 829–37; Benjamin J. Pomerantz, et al., "Pulmonary Resection for Multi-Drug Resistant Tuberculosis," *Journal of Thoracic and Cardiovascular Surgery* 121 (2001): 448–53; and Jose G. Somocurcio, et al., "Surgery for Patients with Drug-Resistant Tuberculosis: Report of 121 Cases Receiving Community-based Treatment in Lima, Peru," *Thorax* 62 (2007): 416–21.

16. For an example of the difficulty of diagnosing tuberculosis today, see Frederick O'Donnell, "A Tuberculosis Event on a Navy Assault Ship," *Military Medicine* 171 (December 2006): 1198–1200; James E. LaMar II and Mark A. Malakooti, "Tuberculosis Outbreak Investigation of the U.S. Navy Amphibious Ship Crew and the Marine Expeditionary Unit Aboard, 1998," *Military Medicine* 168 (July 2003): 523; and Remington L. Nevin, et al., "Suspected Pulmonary Tuberculosis Exposure at a Remote U.S. Army Camp in Northeastern Afghanistan, 2007," *Military Medicine* 173 (July 2008): 684–89. See also David G. Russell, Clifton E. Barry III, and JoAnne Flynn, "Tuberculosis: What We Don't Know Can, and Does Hurt Us," *Science* 328 (14 May 2010): 852–56.

17. R. L. Riley, et al., "Aerial Dissemination of Pulmonary Tuberculosis: A Two-Year Study of Contagion in a Tuberculosis Ward," *American Journal of Hygiene* 70 (1959): 185–196. Chapter 6 discusses this at length.

18. Sepkowitz, "Tuberculosis and the Health-Care Worker"; Dick Menzies, et al., "Tuberculosis Among Health-Care Workers," *New England Journal of Medicine* 332 (12 January 1995): 92–98; E. T. Curran, P. N. Hoffman, and R. J. Pratt, "Tuberculosis and Infection Control: A Review of the Evidence," 2006; and G. de Vries, et al., "Health-Care Workers with Tuberculosis Infected during Work," *European Respiratory Journal* 28 (2006): 1216–21.

19. Peter J. Delves and Ivan M. Roitt, "The Immune System," review article, *New England Journal of Medicine* 343 (6 July 2000): 38.

20. James D Mancuso, Steven K. Tobler, and Lisa W. Keep, "Pseudoepidemics of Tuberculin Skin Test Conversions in the U.S. Army after Recent Deployment," *American Journal of Respiratory and Critical Care Medicine* 177 (June 2008): 1285–89; Iseman, *A Clinician's Guide to Tuberculosis*, 21–49; and M. Rene Howell, "Screening for Mycobacterium Tuberculosis in the U.S. Military: Considerations for a Cost-Effectiveness Model," 16 May 2000, The Johns Hopkins University, Division of Infectious Diseases, Baltimore, MD.

21. For a good discussion of this debate, see Amy Fairchild and Gerald M. Oppenheimer, "Public Health Nihilism vs. Pragmatism: History, Politics and the Control of Tuberculosis," *American Journal of Public Health* 88, (1998): 1105–17; also Leonard Wilson, "The Historical Decline of Tuberculosis in Europe and America: Its Causes and Significance," *Journal of the History of Medicine and Allied Sciences* 45 (July 1990): 366–96.

22. Lerner, *Contagion and Confinement*, 4; and Howard Markel, *When Germs Travel: Six Major Epidemics That Have Invaded America and the Fears They Have Unleashed* (New York, NY: Vintage Books, 2005), 46.