

Chapter Six

“Good Tuberculosis Women”: Tuberculosis Nursing during the Interwar Period

After eight-year-old Martha A. Hauch’s mother died of pulmonary tuberculosis in 1904, Martha went to live with relatives in Virginia. Her father sent them money for her maintenance until his investments failed. To support herself as she became a young woman, Hauch tried teaching, working as a government clerk, and finally enrolled in the Army School of Nursing in January 1922 at the age of twenty-six. Like other nursing schools, the Army School of Nursing considered students an important source of labor. Instruction included coursework and hospital duty. Hauch trained at Walter Reed Hospital in Washington, DC, Fort McHenry in Baltimore, and an affiliated hospital in Philadelphia. At all three locations she cared for tuberculosis patients. In Philadelphia, she said that she worked “in the isolation ward in the obstetrical ward and cared for a very ill tubercular patient both before and after delivery.” Many of her other patients “were in the advanced stages of the disease; a number of them were so ill that very close contact was necessary to care for them properly, such as helping them move, handling sputum cups, which all came under the general nursing care of the patient.”¹

In August 1923, Hauch spit up blood, or as she put it, had “a little color in my throat,” but after a normal X-ray she returned to hospital duty. Five months later she had another hemorrhage, but the Medical Department reported “no definite diagnosis being made,” so she continued to study and work. That August at Walter Reed Hospital, Hauch developed a cough and was finally diagnosed with tuberculosis and transferred to Fitzsimons for “chronic pulmonary tuberculosis, active, upper left lobe.”² Because she had not yet completed her Army School of Nursing course, Fitzsimons put her on light duty status for the remaining three weeks required to complete her training. After graduation, she continued at Fitzsimons as a civilian patient/nurse until the end of 1924 when she became too ill to work.

Fitzsimons’ physicians then tried to give the young woman a pneumothorax but could not because the lung adhered to the chest wall. Her condition deteriorated

and from 6 April to 24 April she had twenty-three hemorrhages and was put on strict bedrest. As one of the fifty to sixty civilians treated at Fitzsimons every year, Hauch paid \$1.50 per day for her care, but after eighteen months her resources were depleted. Not eligible for military benefits, Hauch and her relatives appealed to Congressman R. Walton Moore of Virginia for a private bill to pay her hospital costs. (Private bills are still used today to enable members of Congress to address the special needs of individuals.) Twenty months later Congress approved a private bill to keep Hauch as a patient at Fitzsimons. A congressional committee report stated that "according to the testimony, it appears that Miss Hauch was thrown into such intimate contact with advanced cases of pulmonary tuberculosis in the performance of her duties that it may be reasonable from the medical standpoint to assume that her present physical condition was probably caused by her occupation."³ It is not known how long Hauch survived, but she struggled with the disease for several years, and by June 1928, her relatives were concerned that she would not live long enough to receive the congressionally mandated benefits.⁴

Hauch's case is but one of many examples of the perils of tuberculosis nursing. Modern hospitals and the increasingly aggressive treatment of tuberculosis in the 1920s, 1930s, and 1940s provided expanding job opportunities for nurses, but surgery and invasive procedures that drained wounds and chest cavities filled with purulent matter and tuberculosis bacteria also put them closer to sources of infection. The Army tuberculosis program was designed and directed by "good tuberculosis men," but medical officers may have been less vulnerable to tuberculosis infection than other hospital staff because they only saw patients intermittently during periodic examinations or procedures. Other personnel—hospital orderlies and civilian employees—cared for patients daily, working in the wards, helping to feed and bathe patients. Nurses perhaps were most directly exposed to tuberculosis infection because they cared for the sickest patients for hours at a time, day after day, and assisted physicians in medical and surgical procedures that probed infectious material.

Even though Congress recognized that Martha Hauch and other student nurses were contracting tuberculosis in the Army and authorized federal funds to compensate them, many nurses, doctors, and orderlies would die of the tuberculosis they contracted from their patients before medical institutions and the professions universally adopted appropriate measures to prevent the spread of tuberculosis bacteria from the sick to the well. Tuberculosis specialists, in fact, debated key issues regarding the disease for decades: How was tuberculosis transmitted? Did tuberculosis infection without active disease give an individual a certain degree of immunity to the disease? And what protective measures, if any, should hospitals and medical personnel adopt in caring for tuberculosis patients? In a 1994 article on healthcare workers' exposure to tuberculosis, Kent Sepkowitz stated that "a combination of genuine confusion, ignorance, and willful neglect conspired to keep the debate active and unsettled as late as the 1950s."⁵ Sepkowitz suggested that the reasons for this inaction included hospitals' fears about discouraging young women from tuberculosis nursing, of being sued for transmission of tuberculosis to healthy people, and of losing patient clientele. But the delay in military

and civilian hospitals' adoption of uniform protective protocols was also due to five unresolved issues concerning tuberculosis transmission at the time, specifically: (1) the difficulty in identifying sources of infection due to the ubiquity of tuberculosis in the population and the long and varying latency periods between infection and active disease; (2) the prevailing view that tuberculosis bacteria resided only in effluvia from the patient, especially coughed up sputum, and were therefore not transmissible through the air like measles or influenza germs; (3) the persistent theory that tuberculosis infection conveyed some immunity against the disease and was therefore not undesirable or dangerous; (4) the fact that measures to protect against tuberculosis transmission such as isolation, protective clothing, hand washing, and decontamination, were cumbersome and costly in time and money; and (5) human reluctance or refusal to adopt new ideas. An examination of tuberculosis nursing in the Army during the 1920s, 1930s, and 1940s reveals that although the Army Medical Department and other hospitals practiced rigorous aseptic and antiseptic protocols for surgery and infectious diseases such as diphtheria and scarlet fever, the same practices were not uniformly employed for tuberculosis patients and caregivers.

The Army Nurse Corps

Hauch had joined the second generation of Army nurses. The military had long resisted hiring female nurses, and in the first ten years after Congress established the Army Nurse Corps (ANC) in 1901, only about 100 female nurses served in Army hospitals annually, some of them at Fort Bayard. As the nursing profession grew, however, so did the ANC.⁶ In the last half of the nineteenth century Florence Nightingale, advisor to the British Army, had led the effort to make nursing respectable and professional. In the United States middle-class women swelled the ranks of nursing because it was one of the few professions open to them that provided adequate income and useful work. Whereas in 1900 there were only 16 nurses and 173 doctors per 100,000 people in United States, by 1920 nurses outnumbered doctors 141 to 137 per 100,000 people.⁷ At first the majority of nurses in the country worked in private duty, caring for sick people in their homes, but hospitals increasingly employed registered nurses, so that by the 1940s, hospital nursing became dominant over home care. Historian Barbara Melosh explains that hospital work was attractive to nurses because it provided more steady living and working conditions than private duty, and hospital technology and surgery supported nurses' interest in gaining professional expertise. The institutional setting also protected nurses against the tyranny of any one patient or doctor and provided social support.⁸

For members of the ANC, there was the added attraction of the opportunities for domestic and overseas travel on military assignments. Army nursing came of age during World War I, when the ANC grew to 21,480, but when Congress cut the War Department budget after the Armistice, Army nursing strength dropped dramatically.⁹ During the interwar period the nursing staff, like the rest of the Medical Department, was "woefully short of personnel," according to then-Surgeon

General Merritte Ireland.¹⁰ Only between 675 and 825 Reserve and Regular Army nurses were on active duty during any one year. As was the case at Fitzsimons, many Army hospitals had to employ civilian nurses to provide adequate care to patients.

Surgeon General Ireland was a strong supporter of nursing. He appointed Julia Stimson (Figure 6-1), with whom he had worked in the American Expeditionary Forces, as superintendent of the ANC in 1919. Stimson, of Massachusetts, graduated from Vassar College in 1901. She originally wanted to be a physician, but after her family discouraged her from pursuing that path, she studied medical illustration at Cornell and then entered the New York Hospital School of Nursing in 1904. Working at Children's Hospital in St. Louis, Stimson earned a master's degree from Washington University in 1917. When the United States entered the war, she joined the ANC as chief nurse of Base Hospital No. 21 out of St. Louis. By the end of the war she was chief nurse of the American Expeditionary Forces and received the Distinguished Service Medal for her service. As ANC superintendent,



Figure 6-1. Julia C. Stimson, chief nurse of the American Expeditionary Forces, marching in the victory parade with other members of the Army Nurse Corps, in Paris, 1918. Photograph courtesy of the National Library of Medicine, Image #B027286

Stimson was also dean of the Army School of Nursing, which graduated its first class in 1921. In 1920, she became the first woman to achieve the rank of major. Marlette Condé, an alumna of the Army School of Nursing, said Stimson “was direct in manner, forceful in speech. In uniform, appropriately enough, hers was a ‘commanding’ presence. But she was an approachable person”¹¹ (Figure 6-2). Stimson retired from the Army in 1937, and served as president of the American Nurses Association from 1938 to 1944. During World War II, however, she returned to service to recruit women to the ANC and advise federal agencies on nursing needs. The Army promoted her to colonel just weeks before she died in



Figure 6-2. Julia C. Stimson as superintendent of the Army Nurse Corps, 1919–37. Photograph courtesy of the National Library of Medicine, Image #B08666.

1948 at age 67 of complications following surgery. Stimson always maintained high standards for Army nursing, and required the Medical Department, unlike many other hospitals, to hire only nurses who had graduated from certified schools of nursing.¹² During a national tour of Army posts in March 1932, Stimson reported that she was "well pleased with the high-efficiency which the nurse corps is maintaining at Fitzsimons hospital."¹³

Tuberculosis Nursing

Stimson knew that nursing care of surgical and bedrest tuberculosis patients was critical to recovery. Florence Nightingale, in fact, had believed that nursing was central to the healing process itself. "It is often thought that medicine is the curative process. It is no such thing," Nightingale wrote. Medicine and surgery could only "remove obstructions; neither can cure; nature alone cures.... And what nursing has to do in either case, is to put the patient in the best condition for nature to act upon him."¹⁴ Nursing tuberculosis did require specific training, and during the interwar period nursing journals had numerous columns on the disease, its treatment, and special patient needs.¹⁵ Army School of Nursing students received only general instruction on tuberculosis, so the Army's tuberculosis nurses were largely trained on the wards at Fitzsimons.¹⁶

Institutions like Fitzsimons were worlds unto themselves, and nurses were central to those worlds. Most sanatorium stays began with a journey, first by train and wagon, and increasingly in the 1920s and 1930s by car, to the sanatorium. Many arriving patients had suffered a lung hemorrhage and were quite ill and frightened by their breakdown. This first period was often a blur, but those who have written about their experience always remembered the nurses who come in and out of vision, taking their temperature, adjusting their bedclothes, and cautioning them not to get out of bed or to exert themselves. Tuberculosis specialist and author L. Fred Ayvazian described tuberculosis hospitals and sanatoriums as "highly structured and stable societies populated by individually precarious lives."¹⁷ In their isolation from society, patients occupied themselves in various ways. After being fed and bathed by hospital staff they would sit outdoors or on sun porches, perhaps reading books and magazines, and writing letters, short stories, or newspaper articles. The *Journal of the Outdoor Life*, published by the civilian sanatorium at Lake Saranac, New York, provided a forum for some of this writing. By the 1920s, the radio entertained and provided a connection with the outer world. Phonographs were less desirable because one had to get out of bed to change the records. Other activities that could be done quietly in bed and required little exertion or assistance included stamp collecting, crafts, crossword puzzles, card games, knitting and sewing. A surprising number of tuberculosis patients—and nurses—smoked cigarettes.¹⁸ Patients also spent their time following the disease course in other patients, tracking each others' weight gain and loss, and various medical and surgical procedures. Patients celebrated each others' bacteria-free sputum smears and successful lung collapses and mourned disastrous weight losses or lung hemorrhages. As Fred Ayvazian had noted, "Temperature fluctuations were watched



Figure 6-3. Interior view, solarium in nurses' quarters, Fitzsimons General Hospital, n.d. Photograph courtesy of the National Library of Medicine, Image #A016129.

with Dow-Jones attention....degrees of sputum positivity determined a castelike stratification with its own discriminatory practices.”¹⁹ By watching their room-mates and ward mates, and the activities of hospital staff, patients could better gauge their own progress and treatment.

In this world physicians determined a patient's status and living conditions—whether they were confined to bed, what they could eat, and where. But patients had much more interaction—daily if not hourly—with the nurses. Fitzsimons employed at least eighty nurses at any one time during the interwar years, and, like many civilian and military nurses of the day, they lived on the post (Figure 6-3). Army nurses in the military environment had to adhere to strict regulations for behavior, such as minding curfews and not dating enlisted men or patients, and had their own dining room and Red Cross recreation hall. Nurses worked twelve-hour days, changing shifts at 7:00 a.m. and 7:00 p.m. They alternated night duty stints and were lucky to get one day off per month.²⁰ The Army instructed nurses to greet each patient individually at the beginning of each day shift; to take a patient's temperature, pulse, and respiration every four hours; feed those who could not feed themselves; provide the bedpan; bathe each patient; administer medications and treatments as ordered by the doctor; provide fresh drinking water; keep the bedside and patient's belongings orderly and clean; and notify the head nurse of any change in physical or mental symptoms. This care involved close, intimate

contact with patients. Night nurses had similar duties, as well as preparing patients for bed and counting all opium and opium-derived medicines for the morning report.²¹ They also made bed checks at 10:00 p.m., 2:00 a.m., and 6:00 a.m., and reported any patients not in their beds to the ward surgeon. Helene Sorensen, a Fitzsimons nurse, later remembered that "During the day, the patients rested on the building porches as part of their heliotherapy.... At night, they donned their stocking caps prior to sleeping on the porches or exposure to the fresh air."²² Discipline remained a problem at Fitzsimons, however. Night nurses were responsible for fifteen patients, and one remembered how some patients would stuff their stocking caps with straw and pull up their bedcovers over a bundle of blankets so they could fool the night nurse and go out on the town.²³

Perhaps the most illustrious patient during the interwar period was president of the Philippine Senate, Manuel Quezon, who had become friends with Gen. Douglas MacArthur in the late 1920s, when the latter commanded the Army's Philippine Department. When Quezon developed tuberculosis, then Army Chief of Staff MacArthur convinced him to take treatment at Fitzsimons, and Quezon arrived at the hospital in August 1930.²⁴ Like other patients, the Philippine leader no doubt had to learn the Fitzsimons protocols. He ultimately died of tuberculosis in 1944 in the tuberculosis sanatorium at Saranac Lake, New York, from where he led the Philippine government-in-exile.

About the same time Quezon was there, Helene Belanger had her first assignment in the ANC at Fitzsimons, from 1931 to 1934, and remembered that "we were responsible for tender loving care and nurturing of patients."²⁵ Nurses educated recently arrived patients on their new environment and regime—how to cover their mouths when coughing, spit into the sputum cup, and properly hold a thermometer in their mouths for five minutes. They also instructed them on how to relax in bed, how to avoid talking or laughing with too much animation, and how to totally relax in compliance with the rest cure. When tuberculosis specialist C. L. Minor spoke to nurses at the Army tuberculosis hospital in Oteen, North Carolina, he reminded them to treat patients as individual human beings and not as "cases." He advised that "the mind must be treated as well as the body," and that the nurse was crucial to that task. She must have "not only the confidence but the affection of the patient," and should be alert to the patients' worries, and encourage confidence in the doctor and obedience to his orders. "The doctor and nurse must be optimistic. Thus your radiating of optimism, cheerfulness...will make an optimist out of a pessimistic patient.... There is no such school of character building as tuberculosis bravely met by patient, doctor, and nurse."²⁶

At the Army's Barnes General Hospital at Vancouver Barracks, Washington, nurse Lieutenant (Lt.) Midge Hall worked on the ward with thirty very ill patients and told a revealing story from the 1941 Christmas season. After the nurses had decorated the ward for the holidays she said, "I was bathing the patient when suddenly in the midst of his bath he sat up in bed, and before I knew what was happening he was kissing me on the cheek. I jumped back startled and very angry. He said, 'now now Lieut. you cannot get angry. Look at what you are standing under.' I looked up and there was a piece of mistletoe tied to the light cord. He

said he had been waiting for days for some nurse to get under it. Well, I certainly could not be angry after that.”²⁷

Not all nurses held a romantic view of their work at Fitzsimons. Army nurse Major (Maj.) Edith A. Aynes, who wrote a memoir of her Army experience, *From Nightingale to Eagle*, began her career at Fitzsimons in late 1932. Aynes said her job was “to give nursing care to patients, to ride herd on the military’s morning report and related records, to play policeman on the pass holders, to help check the property for the ward surgeon, and to assist the medical officers.”²⁸ On her first day, Aynes swore to defend the Constitution and then received six white uniforms, six nurse caps, and an Army cape. The next day she began work on ward C-4 for African American patients, most of them World War I veterans. Chief nurse Mary Sheehan presented the ward to Aynes as a benefit for the new nurse because it was segregated by race rather than rank and would therefore give her experience caring for both officers and enlisted patients as well as veterans.²⁹ Aynes remembered that about twenty of the patients were in critical condition and could have died any moment. Another twenty patients were seriously ill, and “all a patient had to do to change from serious to the critical list was to have a sizable hemorrhage.” Every man, Aynes wrote, “knew his symptoms, how he should progress, and what treatment would indicate which way he was headed... He measured his condition by the treatment he received: bedrest, and pneumothorax, repeated sputum tests or X-rays, narcotics for cough, or the appearance of blood.”³⁰

Aynes described the morning routine as an assembly line in which she was assisted by one of the 140 male attendants hired locally to staff the hospital. “When I entered the 25 bed ward to give baths that morning,” she explained, “a white-suited civil servant preceded me down the ward, took the clothes and pajamas off patient after patient, filled the deep basins with water, produced washcloths, towels, and soap, and even warmed the bottle of alcohol for the backrub.” As she bathed one patient he prepared the next one. “The man had been doing the same job for about 15 years and liked it. He was polite, quick, and willing, but he was one in a million.”³¹ Some orderlies were efficient and kind; others broke the rules. Aynes told of one corpsman who smoked marijuana on the wards, smuggling the cigarettes into the hospital in his gloves.³²

Nurses also worked in the laboratories (Figure 6-4) and assisted in surgery, administering anesthesia and caring for patients before and after surgical procedures. In 1936 Fitzsimons surgeons performed 775 operations on tuberculosis patients.³³ “Collapse therapy, [was] very popular in those days,” said ANC nurse Helene Belanger; so were more invasive procedures.³⁴ Rhoda Jahr arrived as a nurse at Fitzsimons in 1938 and reported that they “did thoracoplasties by the dozen! We did them by the ton!” Protective gloves were apparently used only in the operating room. Jahr remembered that “we would scrub our hands with this green soap, we dipped our fingers in iodine, and then in alcohol. Then we would put gloves on.”³⁵ Another nurse explained, “[T]here were no disposable surgical gloves. After the surgeons used the gloves, the gloves would be washed and we would blow them up just like a balloon. That’s how we check for leaks.”³⁶



Figure 6-4. Nurse in laboratory, Fitzsimons General Hospital, n.d.
Photograph courtesy of the National Library of Medicine, Image # A016094.

Working with sick people always had its risks (Figures 6-5 and 6-6), and doctors and nurses caught a wide variety of illnesses. In 1935, for example, at least one-third of the Army's more than 600 nurses were ill enough to be admitted to the hospital. Although only five of them had tuberculosis, these women required much longer hospitalizations than nurses with other maladies and were less likely to recover.³⁷ Sick nurses could lose their jobs. Reta M. O'Brien served as a Reserve Nurse in the ANC during the war and again in 1921. That year ANC head Stimson evaluated O'Brien with the highest grade of numeral "I" for "work, conduct, and health good." But in 1923 Stimson graded her at numeral II, "as her health record was poor," and relieved her from duty "on account of having tuberculosis."³⁸ This was a problem not only for the individual nurse, but for the Medical Department. Years before, Florence Nightingale had understood this. "The



Figure 6-5. U.S. Army, Fitzsimons General Hospital, Denver, Colorado, interior view, Convalescent Room, Surgical Ward. Note the nurse standing at the right next to patient with open chest wound from thoracic surgery, which could be a source of tuberculosis infection. Photograph courtesy of the National Library of Medicine, Image # A04992.



Figure 6-6. U.S. Army, Fitzsimons General Hospital, Denver, Colorado, general treatment room. Photograph courtesy of the National Library of Medicine, Image # A07853.

loss of a well-trained nurse by preventable disease is a greater loss than is that of a good soldier from the same cause," she wrote. "Money cannot replace either, but a good nurse is more difficult to find than a good soldier."³⁹ After having to consider numerous private bills to help women like Martha Hauch, in 1930 Congress authorized formal disability retirement benefits for nurses with service-connected disabilities. From 1932 to 1936, ninety Army nurses retired on disability, eleven of them for tuberculosis. Other ailments included heart disease and digestive disorders, but although the average age of nurses who retired on disability was 46 years, that of nurses who retired with tuberculosis averaged only 29.4 years.⁴⁰

Given the risks, some nurses were determined to avoid caring for tuberculosis patients. As one civilian nurse observed, "getting capable nurses that are not afraid of tuberculosis is most difficult. So many feel perfectly safe in the general hospital or in private practice who would not consider work in a sanatorium because of the supposed danger of infection" (Figure 6-7). The sad thing, she noted, was that "[tuberculosis] patients feel this keenly."⁴¹ In 1919, Stimson dismissed five reserve nurses for misconduct when they refused to work at the Army tuberculosis hospital at Oteen, North Carolina. Even after a warning from the commanding officer, Zilpha Bartlett, Marion Ruth Ross, Alberta M. McHale, Mable Marie Rotzien, and Edyth M. Scott "refused to go on duty, stating the reason for such insubordination was the fact that they did not desire duty at a tuberculosis hospital."⁴² Frances Lafaye Locke, a reconstruction aide, took a more judicious approach. When assigned to Oteen she asked for a transfer because she "feared to stay in a T.B. hospital," and after a month got her transfer.⁴³ Fear of tuberculosis transmission also hurt nurse training. A 1937 study found that only twelve of fifty schools offered nursing students instruction in tuberculosis nursing. Esta H. McNett, a nurse in Cleveland, Ohio, attributed this to "the fear of tuberculosis which now prevents administrators of schools of nursing from arranging affiliations for their students."⁴⁴

Like many tubercular physicians, however, some nurses who had the disease saw it as an asset to their work. A civilian nurse who contracted tuberculosis in her first year in nursing school became a patient in the tuberculosis sanatorium, but after five years returned to school to finish her degree. "It was a hard undertaking," she wrote, because when she broke down again her friends and relatives advised her to give up nursing. "But I can't give up the thing I love," she explained, "I'm specializing in tuberculosis nursing because I understand the tuberculosis patients so well and I'm able to give them the encouragement that a nurse who has never been sick could not give."⁴⁵ For her, nursing had become a special calling.

Debate

By the late 1920s and early 1930s, some physicians began to notice higher rates of tuberculosis among nurses and nursing students than the general population and began to raise questions about tuberculosis transmission and hospital practices. This started a debate that continued without resolution for decades among military and civilian specialists regarding the nature of tuberculosis transmission



Figure 6-7. U.S. Army, Fitzsimons General Hospital, Denver, Colorado, Rehabilitation Aide giving bedside instruction, n.d.
Photograph courtesy of the National Library of Medicine, Image # A07798.

and to what degree individuals were susceptible or immune to active disease. Norwegian physician Johannes Heimbeck published a series of articles in which he tracked the high rates of tuberculosis infection among nurses compared to other groups. He found that 12 percent of student nurses developed active tuberculosis while they were in nursing school.⁴⁶ Others in the United States saw a similar trend. In 1928 Jessamine S. Whitney, statistician for the National Tuberculosis Association, pointed out that more than half of the nurses being supported by the American Nurses Association Relief Fund for invalid nurses had become disabled due to tuberculosis. She called for periodic physical examinations of nurses to monitor tuberculosis infection or the development of active disease and improved working and living conditions to help nurses resist the disease.⁴⁷

Physician J. Arthur Myers at the University of Minnesota eagerly joined the debate, reinforcing Heimbeck's studies with his own observations of high rates of tuberculosis among student nurses, which in 1930 he called "one of the greatest problems in tuberculosis at the present time."⁴⁸ He waged a career-long campaign to convince hospitals to employ stringent contagious disease protocols with all tuberculosis patients. Called the "most prolific and influential writer on the subject of tuberculosis of his time in this country," Myers had earned a Ph.D. in anatomy at Cornell in 1914 but soon developed tuberculosis.⁴⁹ After he recovered,

he joined the faculty of the University of Minnesota medical school and in the course of his career wrote some 700 papers, many of them on tuberculosis, as well as editorials, books, and obituaries. He also edited the British medical journal *Lancet* from 1930 to 1968, and, having vanquished his own tuberculosis, died in 1978 at the age of ninety. Concerned that the increased risks of developing active tuberculosis would discourage young women from tuberculosis nursing, Myers called for careful health surveillance of nursing school applicants and students to track any tuberculosis infections. He also advocated teaching nursing students to use "the same rigid technic [*sic*] as is employed in the prevention of such diseases as diphtheria and scarlet fever."⁵⁰ At the time such measures included isolating patients and requiring them to wear masks when receiving care, and masks, gowns, and gloves for medical personnel when caring for the patient. Myers published yearly on the issue in various medical journals, stressing the continued high rate of tuberculosis infection. In 1940, he wrote, "Hospitals and sanatoriums no longer have any excuse for permitting students of nursing to be exposed to tuberculosis.... Medical asepsis should be instituted and practiced continuously on the medical floors in every hospital and sanatorium."⁵¹ But his words went unheeded.

Perhaps the biggest problem was that because tuberculosis infection was so widespread in the United States until the middle of the twentieth century, and because the latency period between infection and active disease was so variable, it was almost impossible for investigators to identify or fully understand the source of tuberculosis infection. Another problem was that for many years physicians and scientists failed to understand that tuberculosis was transmitted through the air. This was partly due to a desire to lay to rest the old concept that bad air or "miasmas" spread infectious diseases. In a 1928 article, Charles V. Chapin succinctly stated in his authoritative text, *The Sources and Modes of Infection*, that "Adherents of the miasmatic theory of disease must necessarily look to the atmosphere as the bearer of the poison, [and].... the demonstration by the early bacteriologists of the extreme smallness of bacteria served to strengthen this view." Subsequently, however, scientists learned that "the chief way in which living germs can get into the air is in the tiny droplets given off in loud talking, coughing, etc., and rarely did these float more than arm's length." "Thus," Chapin concluded, "the laboratory men have taught us that, under ordinary conditions, and except for a few feet around the coughing patient, the air is a negligible factor in the spread of infection."⁵² This explanation shows that in place of miasmatic theory, physicians and scientists adopted a more material, physical concept of disease transmission that discounted unseen infections in the air, and looked instead to water, milk, blood, sputum, urine, feces, and insects as means of transmission of disease germs to humans. "It has become a comparatively simple matter to control contagious disease," wrote one Navy medical officer, "since it became known a few years ago that the infectious agent of communicable disease is not carried to any great distance through the air, and that the only danger of contracting these diseases is by coming in very close or actual contact with the patient or infected articles."⁵³

Fear of sputum was one of the motivating forces behind the late-nineteenth-century movement to isolate tuberculosis patients in sanatoriums, as specialists

began to distinguish between “open” cases in which patients had tuberculosis bacteria in their sputum, and “closed” cases in which they did not. (Scientists now believe that at least 15 percent of tuberculosis infection comes from sputum negative patients.⁵⁴) Some writers argued that tuberculosis sanatoriums were safer than tuberculosis wards in general hospitals because all personnel and patients were specifically trained to take precautions against transmission, something not done in many hospitals.⁵⁵ Believing that sputum was the primary means of tuberculosis transmission, a nurse wrote in 1920, “It is a popular belief that the tuberculosis person is a constant source of infection to his associates. This is not true.... Even an advanced case whose sputum is full of bacilli, need not be isolated from the family except to have a separate bed, if he is educated to take...precautions.” This meant he must cover his mouth when sneezing or coughing, spit into a receptacle, use separate dishes and utensils, and brush his teeth over the toilet. “The careless or ignorant patient with bacilli in the sputum,” she warned, “is a real menace to his associates.”⁵⁶ In 1922 medical officers Maj. T. E. Scott and Captain (Capt.) R. S. Loving also discounted the view that tuberculosis could be airborne, writing “The usual mode of infection is believed to be through the intestinal tract, by mouth.”⁵⁷ Ernst S. Mariette, a tuberculosis specialist at the University of Minnesota School of Medicine and superintendent of a sanatorium, wrote in 1936 that in order to get tuberculosis “direct contact with the patient is unnecessary but contact with his sputum is.”⁵⁸

In the 1930s, the journal *Diseases of the Chest* even scolded perpetrators of “tuberculosis phobia,” stating “tuberculosis is not a contagious disease in the sense that measles and scarlet fever are contagious diseases. It is a communicable disease and its incidence of communicability is in direct proportion to the lack of hygienic living.” Families could care for tubercular loved ones in their homes if the patient took the proper precautions. Children should be kept away from direct contact with the patient, although “It is perfectly safe for them to come into the room.”⁵⁹ In the 1940s Robert Lovell developed active tuberculosis while in medical school at the University of Michigan, and after a stint in a sanatorium wrote a guidebook for tuberculosis patients. He prescribed proper behavior in the sickroom. “You must always cover your mouth and nose with a wipe when anyone comes within 5 feet of you,” he explained, “for the protection of the people who are taking care of you. Your mouth and nose, therefore, should be covered with a wipe when a doctor is examining or treating you, and when the nurse is bathing you or making the bed while you are in it.”⁶⁰ Beyond the five-foot perimeter, however, he implied, the air was safe.

The third factor mitigating the adoption of preventive measures was the distinction between primary and secondary infection and the persistence of the theory articulated by George Bushnell and others that people who had been infected with tuberculosis early in life and had not developed disease were in some way immunized—“tubercularized”—and would not develop active disease. In 1922, Army physicians noted that “practically everyone who dies after the age of fifteen of other diseases than tuberculosis, will show evidence of past tuberculosis infection.” This, they believed, indicated that these people carried “immune bodies

against the disease."⁶¹ For example, in 1924, responding to concern about the spread of tuberculosis among Filipino soldiers (Scouts) in the U.S. Army, one medical officer reported, "There is absolutely no danger to other Scout soldiers from keeping even active cases in the barracks as the Scout troops are thoroughly immunized against infection from the outside and will break down only from lesions that they already have and as a matter of fact had before their original enlistment."⁶² Similarly, another medical officer wrote that he "thought it was doubtful if we should try for a bacillus-free world, but should rather work for subclinical natural vaccination," thus "training the tissues to meet an inevitable invasion" of tuberculosis.⁶³ Civilians shared this view. According to a civilian physician, "nearly all tuberculosis infection is acquired in childhood; that practically all active tuberculosis in adults originates from this childhood infection, and that adults themselves are practically immune to infection."⁶⁴ This belief seemed to exonerate medical institutions—and governments—from at least some blame for the spread of disease among nurses on tuberculosis wards, because many women had probably already been infected as children, rather than by their patients, and if they had not already been exposed, were therefore now "immune."

During the interwar period public health officials had developed a new tool to understand the level of tuberculosis transmission in the community at large. Tuberculin skin tests could detect tuberculosis infection before the disease advanced to the point of lung damage detectable by X-ray images or fluoroscopic examinations. By 1927, as many as sixty-five different tuberculin tests were available, facilitating health surveillance of civilian and military populations alike.⁶⁵ In the 1930s, for example, scientists Esmond R. Long and Florence B. Seibert tested 18,744 students at twenty colleges and found that positive tuberculin reaction rates ranged from 20 to 30 percent at colleges in the central states to 40 to 60 percent on the East and West coasts.⁶⁶ Hospitals that tested their nurses, nursing students, and other employees then faced the question of whether a positive tuberculin reaction made an individual more or less likely to develop active disease.

The other new tool to fight tuberculosis was a vaccine developed in 1921 known as *Bacille Calmette-Guerin* or BCG, which induced partial but not complete protection from tuberculosis. American medical scientists experimented with the vaccine with mixed results, and when in 1930, more than eighty-five babies of 249 died in Germany after receiving oral BCG vaccine, enthusiasm for BCG further subsided.⁶⁷ Many public health officials opposed BCG because it caused people to have positive tuberculin reactions and thus compromised the tuberculin test, a key tool in screening groups such as student nurses, other hospital staff, and military recruits for tuberculosis.⁶⁸ Ultimately BCG was (and still is) used predominantly in areas of high rates of tuberculosis where partial protection was valuable and where surveillance with tuberculin was rare.⁶⁹

At Fitzsimons medical officers William Pollock and James Hedges Forsee used tuberculin testing to join the debate on immunity and tuberculinization. They followed 755 physicians, dentists, and nurses at Fitzsimons over ten years and in 1934 reported that only thirteen had developed tuberculosis. Staying firmly in the "tuberculinized" school, they cited Bushnell and argued that "individuals

who present evidence of primary tuberculosis are classed as immunes, bearing in mind that their immunity is of a relative character." They called the body's response to tuberculosis "tuberculoallergy," and argued that it developed during the primary infection, and "when maintained at an optimum level, serves as a protective quality throughout life." Pollock and Forsee concluded that "officers and nurses may serve their tour of duty at Fitzsimons General Hospital without fear of contracting tuberculosis from exogenous [external] sources."⁷⁰ In an article the following year they acknowledged "the differences of views in regard to the character and quality of tuberculoallergy," but reiterated their opinion that an initial infection had a protective quality. Some of the thirteen people at Fitzsimons who developed tuberculosis may have already had the disease before they came to Fitzsimons, they suggested, and therefore had not been infected by a patient or colleague.⁷¹ The key was to keep healthy and maintain a strong immune system so one did not break down. This approach put the onus on the individual to maintain a healthy lifestyle. As nurse Edith Aynes wrote, "Since Fitzsimons was primarily a hospital for tuberculosis patients, nurses were expected to eat all three meals so that they would not incapacitate themselves for duty by getting sick!"⁷²

Steps to protect nurses and nursing students included screening them to eliminate tuberculin positive (or negative, depending on the hospital's policy) women, X-raying them every three or six months to detect new infections, isolating patients, and practicing communicable disease technique. In 1935, Jessamine Whitney called for *not* employing nurses with positive tuberculin tests.⁷³ The chief of the Fitzsimons medical service, Lt. Col. George Aycock, noted in 1939, however, that when assigning nurses to the wards, "no differentiation is made at Fitzsimons General Hospital between positive and negative [tuberculin] reactors in selecting them for assignment to duty on tuberculosis wards." He also said that "communicable disease technique is carried out by nurses on wards housing patients with open lesions" (those with tuberculosis bacterium in their sputum), but "such technique is relaxed on wards housing closed cases."⁷⁴ It is not clear just what "relaxed" meant.

Other evidence that Fitzsimons' physicians believed their staff was tubercularized and therefore protected from tuberculosis transmission comes via the pig farm on the post. Robert L. Black, a medical supply officer at the hospital (1929–30), told an interviewer that in addition to handling a number of administrative functions, he also managed the Hereford pig farm. "We had a big herd of pigs, and made lots of money off of them that went to the benefit of the hospital." He explained that "basically, the pig farm was designed to serve the very useful purpose of disposing of edible garbage without having to transport it to the dumps." But, Black continued, "It was later determined by the Veterinary Department that the pigs had picked up a good amount of tuberculosis, so we could not continue to sell them commercially."⁷⁵ The pigs most likely contracted tuberculosis from the cattle on the reservation rather than from the food scraps, but Black's statement suggests that hospital staff and patients continued to eat the pork, perhaps under the assumption that they had immunity.⁷⁶

Another factor in delaying the universal adoption of effective measures to prevent the transmission of tuberculosis was that they were arduous and expensive. The most important and obvious precaution was to segregate tuberculosis patients from other hospital patients, which many hospitals did, despite the cost. Nursing administrators then began to calculate the time required to perform various nursing procedures in order to gauge the nurse staffing necessary to care for patients in isolation. One 1938 study found that while the average ambulant tuberculosis patient required only about one-half hour of care a day, a surgical tuberculosis patient confined to bed required 3.3 hours per day, and that "the hospitals included in this study were generally understaffed." The authors produced a table of nursing hours required for patients with various degrees of disease severity and concluded that "good nursing in the care of tuberculosis patients implies, first, good practice, second a sufficient number of nurses and a sufficient amount of time to put that practice into effect."⁷⁷ This study also showed that the sicker and presumably more infectious patients received more prolonged and intensive nursing care.

The next step hospitals could take to prevent tuberculosis transmission was to examine all incoming hospital patients with X-rays to identify and segregate those who had or might have tuberculosis. Specialists argued then as they do today that the unknown tuberculosis sufferer is more dangerous than the known one. But not all hospitals had the resources for such universal patient screening or even for basic anticontagion measures (Figure 6-8). Physicians at Bellevue Hospital in New York City stated in 1940 that "while it is most desirable to avoid tuberculous infection, we do not believe that this is entirely possible in large general hospitals at the present time." Nurses wore gowns and washed their hands, but "as a rule, nurses do not wear gloves or face masks."⁷⁸ At Fitzsimons, nurse Helene Belanger remembered, "We didn't wear gloves or masks but we did wash our hands a lot"; another nurse, Helene Sorensen, did "not ever remember wearing a mask, having the patient wear a mask, or wearing gloves for procedures."⁷⁹ At the Army's Barnes General Hospital at Vancouver Barracks, an inspection in January 1942 revealed that the precautions were incomplete. "Wards 15 and 13 have been set aside for contagious diseases wards [including tuberculosis] and although being very difficult to invoke enforced rigid isolation in this type of hospital, there has been no spread of communicable disease at any time."⁸⁰

Such laxity had consequences. One physician reported in 1940 that twenty-five student or graduate nurses had developed tuberculosis at twenty-one different hospitals so that even if hospitals used precautionary measures, "To put a nurse in her teens or early twenties, on a tuberculosis service, or in a sanatorium, particularly one who is tuberculin-negative, is courting disaster."⁸¹ A medical director at a civilian tuberculosis sanatorium wrote that because tuberculosis was a leading cause of death among nurses "it must be considered as an occupational disease as far as the nursing profession is concerned."⁸² In 1942, the *American Journal of Nursing* sent a representative to eleven sanatoriums to study the wartime tuberculosis nursing shortage. The investigator, Dorothy Deming, observed that "probably the greatest variance exists in the practice of protective techniques during care." Whereas one hospital required all personnel caring for patients with posi-



Figure 6-8. Photograph of pneumothorax procedure showing nurse and physician without contagious disease protection, Waverly Hills Sanatorium, Kentucky, n.d.. Photograph courtesy of the University of Louisville, Special Collections, Louisville, Kentucky.

tive sputum to wear protective gowns and masks, she found another institution where “masks and gowns are worn only when taking care of *non-tuberculous* patients!” Under such conditions, Deming wrote, “There is little wonder that nurses, especially those in the twenty-five to thirty-five age group, fear tuberculosis and are reluctant to nurse in tuberculosis hospitals.”⁸³

They had good reason. Myers and his colleagues in Minneapolis employed some of the most stringent measures in their tuberculosis wards, where the staff used gowns and masks and washed their hands for two minutes. In 1947 Myers credited such procedures at Fairview Hospital with a reduction in the conversion of student nurses from negative to positive tuberculin tests from 100 percent in 1932, to 33 percent in 1939, to their “ultimate goal” of zero nursing graduates becoming infected during their training in 1945.⁸⁴ But few hospitals at the time took such precautions.

Wade Hampton Frost

The beginning of the end of the theory of tubercularization arrived in 1937 with an article by Wade Hampton Frost, an epidemiologist with the Public Health Service, that transformed public health strategies toward tuberculosis and set the framework for the modern approach to infectious disease control. Medical historian Barron Lerner has called the article “seminal.”⁸⁵ Frost gained a lifelong interest in tuberculosis after he contracted the disease as a young man. He went

to Asheville, North Carolina, for treatment, and once recovered, pursued a career in epidemiology. His biographer, Thomas Daniel, believes that "Frost's greatest contributions to the understanding of a specific disease and to the field of epidemiology came from his studies of tuberculosis."⁸⁶ Frost's 1937 article reviewed the improvements in public health institutions and strategies and noted the declining tuberculosis mortality and morbidity rates in the United States. He challenged, however, the theory that childhood infection with tuberculosis rendered a measure of immunity to adults and questioned "the extremely pessimistic view of tuberculosis control" that supported universal infection of tuberculosis—the tubercularization theory. In an article published after his death from cancer Frost stated his challenge to the tubercularization theory most succinctly: "To have passed through a period of high mortality risk confers not protection, but added hazard in later life."⁸⁷ He argued instead for more strenuous efforts to prevent transmission: "if, in successive periods of time, the number of infectious hosts is continuously reduced, the end-result of this diminishing ratio, if continued long enough, must be extermination of the tuberculosis bacillus."⁸⁸ In other words, as the national population shifted from a majority of infected persons to a majority free from tuberculosis infection, public health officials could one day control the disease.

Frost also reasoned that "as the cases become fewer and fewer, preventive measures should be centered more and more upon the open cases."⁸⁹ He did not dismiss the role of immunity entirely; instead he argued that "one of the most important factors in the decline of tuberculosis has been progressively increasing human resistance." Therefore, the most powerful weapon against tuberculosis would be the "progressive improvement in the social order as a whole." Frost envisioned a new public health approach to tuberculosis whereby officials would identify, isolate, and care for the sick in sanatoriums and then identify and isolate their infected contacts to stop the spread of disease. He also called for more vigorous efforts to find and treat early cases of tuberculosis and special protection for groups most prone to the disease, which essentially meant improving the standard of living for the poor.⁹⁰ In sum, he proposed to *identify*, *isolate*, and *treat* all cases of tuberculosis in the country.

Other physicians began to adopt Frost's approach. In 1942, Ruth Rice Puffer, a biostatistician at the Tennessee Department of Public Health, cited his 1937 article and used the term "index case" to describe the first individual in a family or community suspected of having tuberculosis, around whom public health officials could test, isolate, and treat all others.⁹¹ Arthur Myers described the transition: "The theory that it is dangerous to the future control of tuberculosis to prevent the young from becoming infected with tubercle bacilli has been replaced with the fact that the only safe procedure is to protect humanity everywhere, regardless of the age of individuals, against primary infection and reinfection with tubercle bacilli."⁹² The Army's tuberculosis specialist during World War II, Esmond R. Long, also recognized the importance of Frost's views in tuberculosis epidemiology. He explained that a "new understanding" of tuberculosis was "reflected in a radically changed approach to the public health attack on the disease. Two principal

procedures became recognized as the nucleus for tuberculosis control: case finding and isolation of discovered cases.”⁹³ Frost’s 1937 recommendations to reduce the tuberculosis exposure to the U.S. population would not reach the tipping point of consensus, however, until the late 1950s when tuberculosis had already yielded to heart disease and cancer as the leading causes of death in the United States.

Herein lies the fifth reason for the delay of the adoption of new control measures: People are often loathe to abandon long-held views and adopt new ideas. As Thomas Kuhn explains in *The Structure of Scientific Revolutions*, it requires the accumulation of a large body of evidence anomalous to a long-held scientific theory to change the way people think. Medical literature into the 1940s and 1950s shows that the tubercularization theory and the focus on sputum as the source of contagion endured as the prevailing understanding.⁹⁴ A nurse writing in 1947 about the importance of protective practices noted, “*This is a controversial subject*, but until there is proof that aseptic technique is unnecessary, it seems worthwhile.”⁹⁵

During World War II the Fitzsimons newspaper, *Stethoscope*, celebrated the hospital’s twenty-fifth anniversary with a special edition showing eight pages of photographs comparing the facilities and equipment of “yester-year” with the modern, 1943 versions, including a new dormitory, mess hall, and recreation center for nurses.⁹⁶ A *Stethoscope* article the next year, however, showed medical staff performing a pneumothorax procedure on a patient without a protective mask.⁹⁷ Not until well after the war would tuberculosis treatment protocols require the strict isolation of patients, negative air-pressure rooms, and the use of respirators by medical personnel. During the interwar period, then, hospital and sanatorium workers, as well as family and friends caring for tuberculosis patients, continued to develop the disease. And nurses, who cared for the sickest patients day in and day out, would continue to fall ill at higher than average rates. The tuberculosis men and women of the Army Medical Department and in civilian institutions across the country would continue to struggle to defeat this insidious disease. They would also have to weather a Great Depression and another world war.

Notes

1. Martha A. Hauch to Civil Employees' Compensation Commission, 16 January 1928, U.S. Congress, House Rpt. No. 1173, Committee on Claims, to accompany S. 1368, 70th Cong., 2nd sess., 10. This discussion of the Hauch case is drawn from this committee report and documents in Record Group [hereafter cited as RG] 112, Records of the Surgeon General of the Army, Entry 31, 1928–37, Box 285, National Archives and Records Administration [hereafter cited as NARA].

2. U.S. Congress, House Rpt. No. 1173, 5.

3. U.S. Congress, House Rpt. No. 1173, 1.

4. May L. Campbell and Mrs. W. G. Campbell to Hon. R. Walton Moore, 26 June 1928, RG 112, Entry 31, 1917–27, Box 285, NARA.

5. Kent A. Sepkowitz, "Tuberculosis and the Health-Care Worker: A Historical Perspective," *Archives of Internal Medicine* 120 (January 1994).

6. On the history of military nursing, see Mary Sarnecky, *A History of the Army Nurse Corps* (Philadelphia, PA: University of Pennsylvania Press, 1999); Elizabeth A. Shields, "A History of the United States Army Nurse Corps, 1901–37," Ed.D. dissertation, Columbia University, 1980; Rita Chow et al., "Historical Perspectives of the United States Air Force, Army, Navy, Public Health Service, and Veterans Administration Nursing Services," *Military Medicine* 143 (July 1978): 457–63; and Connie L. Reeves, "The Military Women's Vanguard, Nurses," in Judith Hicks Stiehm, ed., *It's Our Military Too! Women and the U.S. Military* (Philadelphia, PA: Temple University Press, 1996).

On the history of nursing see Patricia D'Antonio, *American Nursing: A History of Knowledge, Authority, and the Meaning of Work* (Baltimore, MD: Johns Hopkins, 2010); Arlene W. Keeling, *Nursing and the Privilege of Prescription, 1893–2000* (Columbus, OH: Ohio State University Press, 2007); Susan M. Reverby, *Ordered to Care: The Dilemma of American Nursing: 1850–1945* (Cambridge, UK: Cambridge University Press, 1987); Darlene Clark Hine, *Black Women in White: Racial Conflict and Cooperation in the Nursing Profession, 1890–1950* (Bloomington, IN: Indiana University Press, 1985); Barbara Melosh, *"The Physician's Hand": Work Culture and Conflict in American Nursing* (Philadelphia, PA: Temple University Press, 1982); and Janet Wilson James, "Isabel Hampton and the Professionalization of Nursing in the 1890s," in Morris J. Vogel and Charles E. Rosenberg, *The Therapeutic Revolution: Essays in the Social History of American Medicine* (Philadelphia, PA: University of Pennsylvania Press, 1979).

7. Reverby, *Ordered to Care*, 159. The decline in doctors was due to the imposition of strict education and licensing requirements in many states during the early twentieth century.
8. Melosh, "The Physician's Hand," 160.
9. Sarnecky, *A History of the Army Nurse Corps*, 135.
10. Merritte Ireland to Chief of Staff, memorandum, 18 April 1928, RG 112, Entry 29, 1928–37, Box 26, NARA.
11. "Superintendents and Chiefs of the Army Nurse Corps, 1901–1975," available at the Army Nurse Corps Association Web site: <http://e-anca.org/ANCchiefs.htm>, accessed 10 October 2012; and Washington School of Medicine, "Missouri Women in Health Sciences" Web site, <http://beckerexhibits.wustl.edu/mowihsp/bios/index.htm>, accessed 24 August 2012.
12. The Army did not commission male nurses until 1955.
13. *Stethoscope*, Fitzsimons General Hospital newspaper, March 1931, 24. From the files of the Office of Medical History, Office of The Surgeon General, Falls Church, VA.
14. Florence Nightingale, *Notes on Nursing: What It Is, and What It Is Not*, reprint ed. (Philadelphia, PA: J. P. Lippincott, 1860), 133.
15. See, for example, the December 1933 issue of the *American Journal of Nursing*.
16. 6th Annual Course of the Army School of Nursing, RG 112, Entry 283, 1923–24, Box 273, NARA.
17. L. Fred Ayvazian, "The 55 Trudeau Medalists (1926–1980)," *American Review of Tuberculosis* 55 (April 1980): 757. Ayvazian served as a captain in the Army at Fitzsimons during the Korean War, 1951–53. See "Dr. Levon Fred Ayvazian, Physician Writer," *Daily Hampshire Gazette* (3 November 2009).
18. Physicians did not agree on whether cigarette smoking was harmful to tuberculosis patients. See Editorial, "Cigarettes and Tuberculosis," *Diseases of the Chest* 2 (July 1936): 5–6.
19. Ayvazian, "The 55 Trudeau Medalists," 757.
20. Edith A. Aynes, *From Nightingale to Eagle* (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1973), 42.
21. 6th Annual Course of the Army School of Nursing.
22. *Stethoscope* [published by Fitzsimons Army Medical Center], 1996, 3.
23. *Stethoscope*, 1996, 3.
24. John W. Martyn, "Memorandum for the Surgeon General," 18 August 1930, RG 112, Entry 31, 1928–37, Box 285, NARA.
25. *Stethoscope*, 1996, 8.
26. Della U. Knight, "Care and Treatment of Tuberculosis Patients," *U.S. Naval Medical Bulletin* 18 (1923): 121.
27. Margaret Elizabeth Gaule, "The Diary of an Army Nurse," unpublished manuscript, Okinawa, 1945, in possession of the author, 8.
28. Aynes, *From Nightingale to Eagle*, 41–42.
29. Aynes, *From Nightingale to Eagle*, 40.
30. Aynes, *From Nightingale to Eagle*, 37–42.
31. Aynes, *From Nightingale to Eagle*, 43.
32. Aynes, *From Nightingale to Eagle*, 48.
33. *Fitzsimons Annual Report*, 1936, 27–32. On nursing for surgical treatment of tuberculosis see Ralph Adams, Adelaide Joseph, and Ruth Pierce, "Chest Surgery," *American Journal of Nursing* 40 (August 1940): 893–902; Lisa Lincoln, "Thoracoplasty—Nursing Care," *American Journal of Nursing* 44 (November 1944): 1022–27; Vera Kezar, "Tuberculosis with Pneumonectomy," *American Journal of Nursing* 49 (March 1949): 188–90;

and Bess M. Ellison, "Nursing Care and Collapse Therapy," *American Journal of Nursing* 50 (August 1950): 473–75. See also Stephanie Kirby, "Sputum and the Scent of Wall-flowers: Nursing in Tuberculosis Sanatoria 1920–1970," *Social History of Medicine* 23 (December 2010): 602–20.

34. *Stethoscope*, 1996, 3.

35. *Stethoscope*, 1996, 12.

36. *Stethoscope*, 1996, 13–14.

37. In 1935, tuberculosis accounted for 903 days lost per nurse compared to 528 for all diseases of the nervous system and 694 days lost for all diseases of the circulatory system. *Annual Report of the Surgeon General*, 1935, 120–21.

38. Julia Stimson to Ida F. Butler, 20 August 1923, RG112, Entry 29, 1917–27, Box 91, NARA.

39. Florence Nightingale, *Notes on Hospitals* (London, UK: Longman, Green, Longman, Roberts and Green, 1863), 21.

40. Julia C. Stimson to the Surgeon General, 17 July 1936, RG 112, Entry 29, 1928–37, Box 29, NARA.

41. Mary C. Campbell, "The Nurse's Problems in Sanatorium Management," *Journal of the Outdoor Life* 16 (1919): 339.

42. Julia C. Stimson to Clara D. Noyes, 5 August 1919, RG 112, Entry 29, 1917–27, Box 93, NARA.

43. Laura Brackett Hoppin, *History of the World War Reconstruction Aides* (Millbrook, NY: William Tyldsley, 1933), 63–64.

44. Esta H. McNett, "The Nursing Care of Tuberculosis Patients," *American Journal of Nursing* 37 (1937): 1031.

45. E. L. W., "The Right Nurse for Tuberculosis," letter to the editor, *American Journal of Nursing* 35 (1935). Also Claire Gilstrap, "An R. N. Takes the Cure," *American Journal of Nursing* 27 (1927): 629–31.

46. J. Heimbeck, "Immunity to Tuberculosis," *Archives of Internal Medicine* (1928): 336–42; and Heimbeck, "Tuberculosis in Hospital Nurses," *Tubercle* 18 (1936): 97–99.

47. "Tuberculosis among Young Women, with Special Reference to Tuberculosis among Nurses," *American Journal of Nursing* 28 (1928): 766–68.

48. J. A. Myers, "The Prevention of Tuberculosis among Nurses," *American Journal of Nursing* 30 (1930), 1361–72.

49. Julius L. Wilson, "Five Great Teachers in the Field of Tuberculosis," *American Review of Tuberculosis* (May 1981): 572.

50. Myers, "The Prevention of Tuberculosis among Nurses."

51. J. Arthur Myers, "Tuberculosis among Nurses," *American Journal of Nursing* 32 (1932): 1159–65; J. Arthur Myers and Harold S. Diehl, "The Student Nurse and Tuberculosis," *Journal of the American Medical Association* 102 (23 June 1934): 2086–88; Harold S. Diehl and J. Arthur Myers, "Tuberculosis and College Students," *Transactions of the National Tuberculosis Association* 32 (1936): 163–71; J. Arthur Myers, H. S. Diehl, Ruth E. Boynton, and Benedict Trach, "Development of Tuberculosis in Adult Life," *Archives of Internal Medicine* 59 (January 1937): 27–31; Willard B. Soper and J. Burns Anderson, "Pulmonary Tuberculosis in Young Adults," *American Review of Tuberculosis* 39 (1939): 9–32; and G. H. C. Joynt, "Tuberculin Tests on Student Nurses," *Chest* 5 (1939): 9–12.

Other studies included Ernest S. Mariette, "The Tuberculosis Problem among Nurses in Eight Tuberculosis Sanatorium," *American Journal of Nursing* 36 (1936): 605–17; Sidney J. Shipman and Elizabeth A. Davis, "Tuberculin Hypersensitivity and Tuberculosis Disease among Nurses: A Study of the Nursing Personnel of the University of California Hospital," *American Journal of Nursing* 28 (1928) 769; Everett K. Geer, "Tuberculosis among

Nurses," *Archives of Internal Medicine* 40 (1932): 77–87; Everett K. Geer, Earl J. Black, and H. E. Hilleboe, "Tuberculosis among Nurses—A 10-Year Survey," *Transactions of the National Tuberculosis Association* (1939): 253–57; and Paul Vincent Davis, "Tuberculosis among Nurses," *Chest* (1940): 214–20.

52. Charles V. Chapin, "The Science of Epidemic Diseases," *The Scientific Monthly* (June 1928): 485; and Charles V. Chapin, *The Sources and Modes of Infection* (New York, NY: John Wiley and Sons, 1910). See also Richard L. Riley, "Historical Background," in special issue, "Airborne Contagion," *Annals of the New York Academy of Sciences* 353 (December 1980): 3–9; Chad J. Roy and Donald K. Milton, "Airborne Transmission of Communicable Infection—The Elusive Pathway," *New England Journal of Medicine* 350 (22 April 2004): 1710–12.

53. W. C. Newton, "The Care of Contagious Diseases," *U.S. Naval Medical Bulletin* Supplement No. 8 (January 1919): 7.

54. A. Tostmann et al., "Tuberculosis Transmission by Patients with Smear-negative Pulmonary Tuberculosis in a Large Cohort in the Netherlands," *Clinics of Infectious Disease* 48 (15 February 2008): 496–97; and Alka M. Kanaya, David V. Glidden, and Henry F. Chambers, "Identifying Pulmonary Tuberculosis in Patients with Negative Sputum Smear Results," *Chest* 120 (August 2001): 349–55.

55. W. H. Oatway, "Stop Spreading Tuberculosis!" *Modern Hospital* 53 (December 1939): 51–52; A. Myers, F. D. Herrington, and T. L. Streukens, "Personnel, Patients and TB," *Modern Hospital* 54 (January 1940): 58–60; and M. Pollack, "Do Our Hospitals Actually Spread Tuberculosis?" *Modern Hospital* 53 (August 1939): 44–45.

56. M. P., "The Nurse and Her Relation to Pulmonary Tuberculosis," *American Journal of Nursing* 20 (1919–1920): 463.

57. T. E. Scott and R. S. Loving, "Pulmonary Tuberculosis," *Journal of the Outdoor Life* 29 (June 1922): 167, 168. See also James G. Cumming, "Can the Tuberculosis Transmission Rate Be Reduced?" *Journal of the American Medical Association* 74 (17 April 1920): 1072.

58. Ernest S. Mariette, "The Tuberculosis Problem among Nurses in a Tuberculosis Sanatorium," *American Journal of Nursing* (1936): 605. On the role of sputum see Editorial, "Tuberculophobia," *Diseases of the Chest* 11 (July 1936): 6–7.

59. Editorial, "Tuberculophobia."

60. Robert G. Lovell, *Taking the Cure: The Patient's Approach to Tuberculosis* (New York, NY: MacMillan, 1948), 28.

61. T. E. Scott and Captain R. S. Loving, "Pulmonary Tuberculosis," *Journal of the Outdoor Life* 29 (June 1922): 167–68.

62. George R. Callender, "Tuberculosis and Filipinos," 17 May 1924, RG 112, Entry 29, Box 189, NARA.

63. Henry J. Nichols, "Some Medical Problems of the Day," *Military Surgeon* (September 1925): 261.

64. Robert B. Kerr, "The New Conception of Tuberculosis Infection," *American Journal of Nursing* 29 (November 1929): 1282.

65. Sociologist Paul Starr has argued that such testing encouraged a shift in public health policy and practice from improving social conditions and people's standard of living to focusing on individuals as the source of disease. Paul Starr, *The Social Transformation of American Medicine* (New York, NY: Basic Books, 1982), 191–92.

66. Esmond R. Long and Florence B. Seibert, "The Incidence of Tuberculous Infection in American College Students: Determination by Standardized Tuberculin on 18,744 College Entrants in 1935–1936," *Journal of the American Medical Association* 108 (22 May 1937): 1761–65. See also Esmond R. Long, "Tuberculosis and College Students,

with Special Reference to Tuberculin Testing," *Lancet* 55 (1937): 201–3; J. Arthur Myers, "Types of Tuberculosis Lesions Found in the Chests of Students of Nursing and Medicine," *American Review of Tuberculosis* 28 (1933): 93–117; and Heather Munro Prescott, "The White Plague Goes to College: Tuberculosis Prevention Programs in Colleges and Universities, 1920–1960," *Bulletin of the History of Medicine* 74 (2000): 735–72. See also Lee H. Ferguson, "Pulmonary Tuberculosis and Students," *American Journal of Public Health* 20 (1930) 955–62; H. W. Hetherington, F. M. McFedran, H. R. M. Landis, and E. L. Opie, "Tuberculosis in Medical and College Students," *Archives of Internal Medicine* 48 (1931): 734–43; Willard B. Soper and Julius L. Wilson, "Experience and the Detection of Pulmonary Tuberculosis in 3,000 Students Entering Yale University," *Transactions of the National Tuberculosis Association* (1932): 99–101; H. W. Hetherington, F. M. McPhedran, H. R. M. Landis, and E. L. Opie, "Further Study of Tuberculosis among Medical and Other University Students," *Archives of Internal Medicine* 55 (May 8, 1935): 709–26; Willard B. Soper and J. Burns Anderson, "Pulmonary Tuberculosis and Young Adults," *American Review of Tuberculosis* 39 (1939): 9–32; and Phyllis Q. Edwards and Lydia B. Edwards, "The Story of the Tuberculin Test from an Epidemiologic Viewpoint," *American Review of Tuberculosis* 81 (January 1960): 1–47.

67. Georgina D. Feldberg, *Disease and Class: Tuberculosis and the Shaping of Modern North American Society* (New Brunswick, NJ: Rutgers University Press, 1995), 64. On Bacille Calmette-Guerin (BCG) and tuberculosis see Michael D. Iseman, *A Clinician's Guide to Tuberculosis* (Philadelphia, PA: Lippincott Williams & Wilkins, 2000), 399–416; and Thomas Dormandy, *The White Death: A History of Tuberculosis* (New York, NY: New York University Press, 1999). Feldberg provides an analysis critical of U.S. policy; and Lee B. Reichman and Janice Hopkins Tanne argue, "Our feeling is that even a very effective strain of BCG does no more than protect infants and very young children against severe forms of TB," in *Timebomb: The Global Epidemic of Multi-Drug-Resistant Tuberculosis* (New York, NY: McGraw-Hill, 2002), 33. On BCG testing, also see Clifford Rosenberg, "The International Politics of Vaccine Testing in Interwar Algiers," *American Historical Review* 117 (June 2012): 671–97.

68. As Rene Dubos explained, Americans resisted BCG because "BCG induced a positive tuberculin reaction in the detection of asymptomatic disease." Such a view "was associated with the restrictive immigration policies of the 1920s and the related suspicion that immunization might hide otherwise detectable diseases," Rene Dubos and Jean Dubos, *The White Plague: Tuberculosis, Man, and Society* (New Brunswick, NJ: Rutgers University Press, 1952, 1987), xxxii and 60. Also J. Arthur Myers, "The Effects of the Diminished Incidence of Primary Infection on the Tuberculosis Control Program," *Diseases of the Chest* 22 (December 1952): 615–16.

69. On the more recent use of tuberculin testing see "Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection," *Morbidity and Mortality Weekly Review* 49 (9 June 2000); and the Centers for Disease Control (CDC) and Prevention Web site, "Tuberculosis, Testing and Diagnosis," <http://www.cdc.gov/tb/publications/factsheets/testing/skintesting.htm>, accessed 24 August 2012.

70. William C. Pollock and James Hedges Forsee, "Tuberculosis among Doctors and Nurses at Fitzsimons General Hospital," *Military Surgeon* 75 (July 1934): 17–21 and the CDC Web site at <http://www.cdc.gov/tb/publications/factsheets/testing/skintesting.htm>, accessed 24 August 2012.

71. William C. Pollock and James Hedges Forsee, "Reinfection among Tuberculoallergic Doctors and Nurses at Fitzsimons Hospital," *American Review of Tuberculosis* 31 (1935) 203–16.

72. Aynes, *From Nightingale to Eagle*, 38. Exclamation in the original.
73. "Controlling Tuberculosis among Student Nurses," *Modern Hospital* 47 (October 1936): 53; Ernest S. Mariette, "Prevention of Tuberculosis among Nursing and Auxiliary Personnel," *American Journal of Nursing* 46 (December 1946): 825–27; and Benjamin W. Black, "Protecting Personnel against the Hazard of Tuberculosis," *Modern Hospital* 53 (November 1953): 63–64. On tuberculin positives, see Ernest S. Mariette, "The Tuberculosis Problem among Nurses in a Tuberculosis Sanatorium," *American Journal of Nursing* 36 (1936): 605–17.
74. G. F. Aycock memorandum to the adjutant, Fitzsimons General Hospital, 27 May 1939, RG 112, Entry 29, 1938–40, Box 66, NARA.
75. "Interview, Robert L. Black with Michael Baker, at FS in 1929–1930," in U.S. Army Military History Institute, Carlisle, PA, 1984, 19.
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80. Leslie N. Nunn, "Sanitary Report for the Month of December 1941," 1 January 1942, RG 112, Entry 31, 1938–44, Box 203, NARA.
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