

Chapter XIV

THE DENTAL SERVICE IN THE AMERICAN EXPEDITIONARY FORCES IN FRANCE, 1917– 1919: ORAL AND DENTAL CARE

Introduction

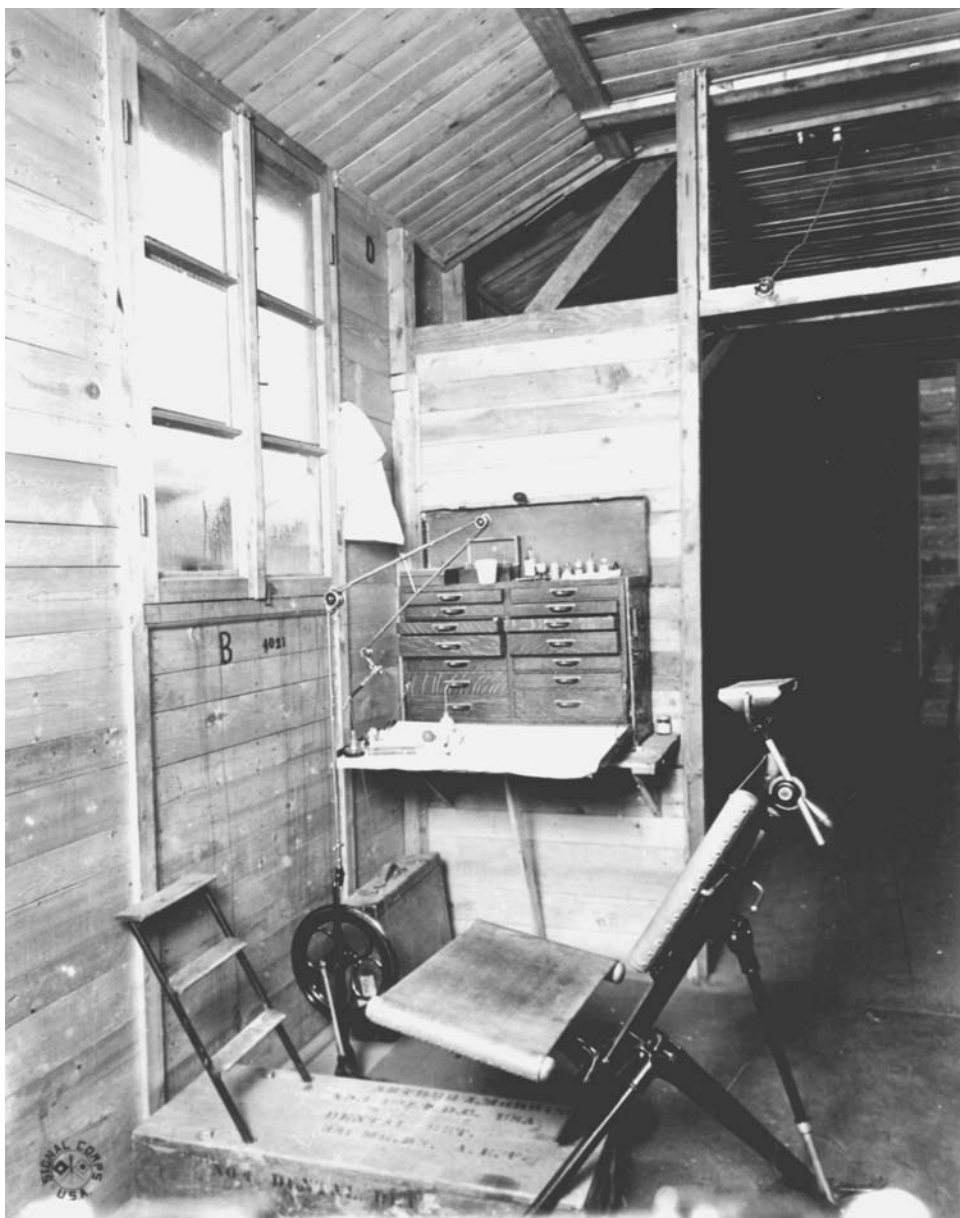
Within the limits of personnel, organization, and equipment that constrained their preparations, Colonel Robert Oliver and the dental surgeons in the American Expeditionary Forces (AEF) organized, equipped, and carried out their assigned missions as best they could. The real test for the Army dental officers and their assistants came in the AEF's hospitals, dental clinics, and especially in the front line combat divisions, where they faced the uncertainty and dangers of modern warfare. For many, that test came within weeks of their arrival on the French shores.

Dental Work in a Base Hospital

Medical units, including dental staff, flowed into France as Oliver worked to resolve the multitude of problems in administration and logistics confronting the dental service. These medical units were expected to meet their missions almost immediately, regardless of conditions. An example of the problems they faced can be drawn from the experience of Base Hospital No. 18 from Johns Hopkins University, which arrived at Saint Nazaire, France, on June 28, 1917. While the hospital was temporarily attached to Base Hospital No. 1 at Saint Nazaire, First Lieutenant Livius Lankford of the Dental Reserve Corps (DRC), the assistant dental surgeon, opened the first dental clinic in France for AEF soldiers. The history of Base Hospital No. 18 claimed that "the service rendered was of such character as to call forth praise from all those who received attention—and the appointment lists were always taxed to their capacity." On July 26, 1917, the unit finally reached its assigned location in the advance section to operate what was then called US Army Hospital No. 2 (it reverted to the designation Base Hospital No. 18 on September 21, 1917) at Bazoilles-sur-Meuse near Neufchâteau in the northwestern part of the Vosges Department in northeastern France. Once in place, the Hopkins unit was the most forward American hospital, and received its first patients on July 31.¹⁻⁸

The dental department, however, did not open until August 26 because of a delay in the arrival and installation of equipment. First Lieutenant B Lucien Brun, DRC, and Lieutenant Lankford were both residents of Baltimore and members of the unit when it was called to active duty.⁶⁻⁸ In August 1917 Brun reported the slow start up of the dental service:

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Dental room at Camp Hospital No. 64, Chatillon, France, January 1919, showing the portable dental outfit set up. Photograph: Courtesy of the National Library of Medicine.

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*Doctor Livius Lankford at Base Hospital No. 18,
Bazoilles sur Meuse, France, November 1, 1918.
Photograph: Courtesy of Dr Lankford's daughter, Mrs Fred Henninghausen.*

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*Doctor Livius Lankford with a patient in what he called
"my operating room at St. Nazaire," 1917.*

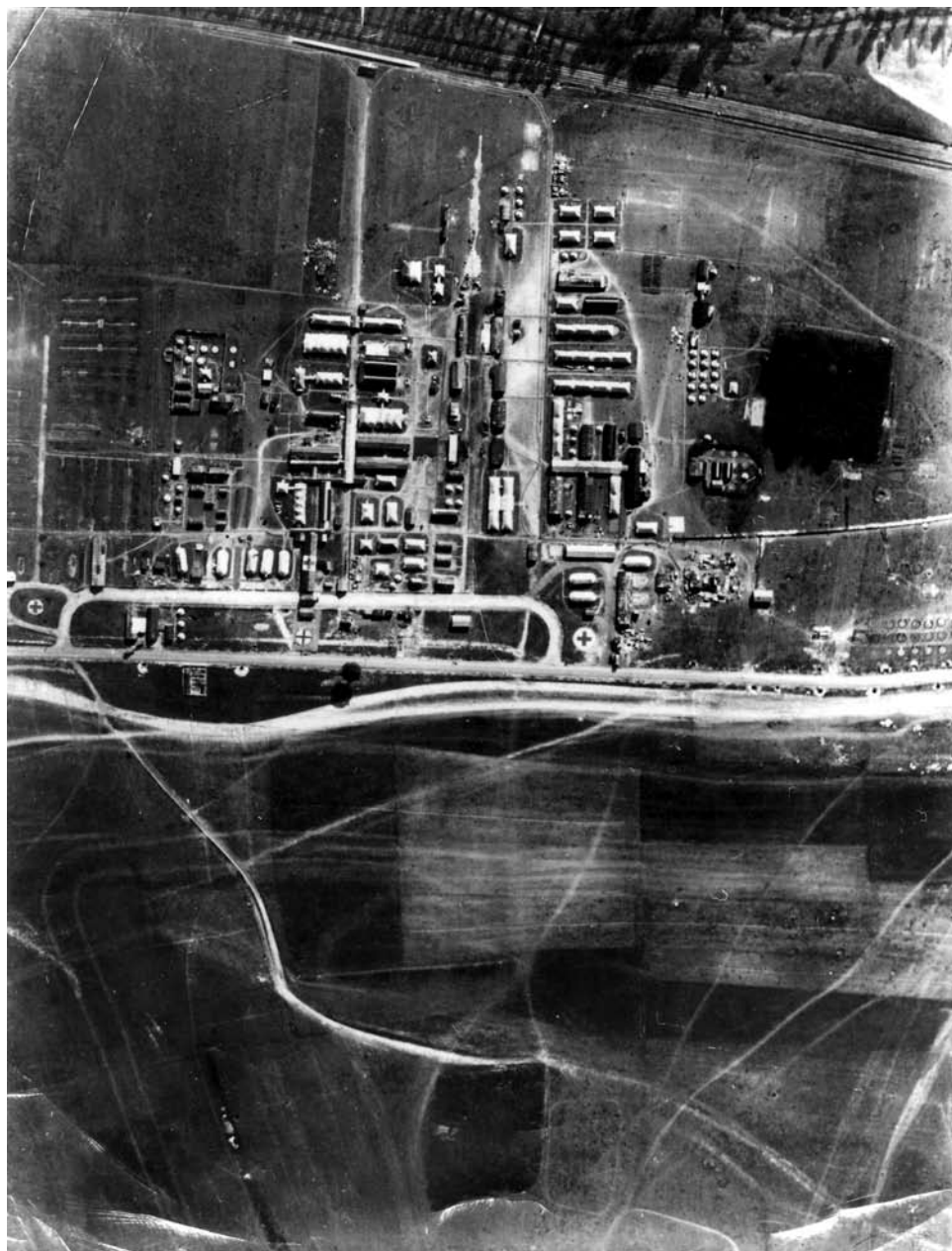
Photograph: Courtesy of Dr Lankford's daughter, Mrs Fred Henninghausen.

Owing to fact that Government forms were not received by the Dental Department until August 29/17 no complete record was kept of work performed in Dental Department prior to that date, it not being known just what information was desired. Dental Department in operation but four days in present month, from Aug. 28 to Aug. 31, with incomplete outfit.⁹

Base Hospital No. 18 took over facilities that the French had built and used as a 1,000-bed war hospital since March 1916. Located on the grounds of an old chateau, the hospital consisted of 36 frame barracks grouped about the chateau, which served as an office and administration building. There were 25 buildings for the hospital proper; 20 were used as wards, then there was an operating room, receiving office and shower baths, clothing room, linen and supply room, and one barracks for the enlisted troops. Eleven general purpose buildings served as officers' barracks, six as more troop barracks, one each as kitchen and mess hall, carpenter shop, fumigation room and plumber's shop, storage building, and morgue.²

The Americans made some changes to the operating pavilion, namely, adding a dental department; eye, ear, nose, and throat department; laboratory; and

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Base Hospital No. 18, aerial view.
Photograph: Courtesy of Dr John M. Hyson, Jr, Collection Office of Medical History.
Office of The Surgeon General, US Army, Falls Church, Virginia.

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*Livius Lankford (left), unidentified officer, and
Major B Lucien Brun (right), at Base Hospital No. 18.
Photograph: Courtesy of Doctor Lankford's daughter, Mrs Fred Henninghausen.*

increased space for the X-ray department. Also, the large number of female nurses made it necessary to dedicate two of the French wards as their living quarters, and another as a combined kitchen, dining, and living room for them. There were two medical and two surgical wards, along with single wards for officers, patients with infectious diseases, neurological patients, and ambulant cases. The capacity of these wards was 375 beds.²

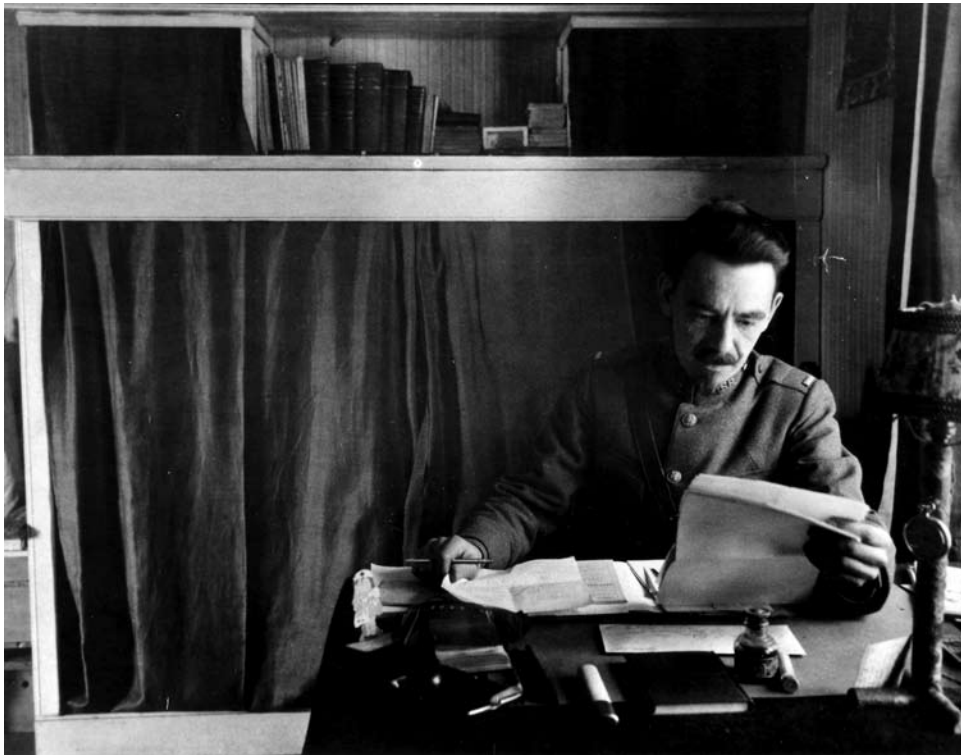
In the report of an inspection conducted on February 28, 1918, Colonel Henry C Fisher of the Medical Corps (MC), the AEF's general sanitary inspector, noted that Lieutenant Brun was in charge of the dental department where "excellent work being done," but that it was equipped only "for ordinary work, not for plastic work. No facilities for plate and bridge work."¹⁰ In March 1918 Brun went to the Army Sanitary School for 2 weeks of special training, which included some maxillofacial surgery instruction under First Lieutenant (later Lieutenant Colonel) William H Potter (1856–1928). Potter was professor of operative dentistry at Harvard Dental School, formerly served on the staff of the American Ambulance at Neuilly, and had come to France in June 1917 with Harvard's Base Hospital No. 5, spending 6 months with the British Expeditionary Forces. Potter was thoroughly familiar with current British, French, and American practice for treating jaw fractures and wounds, which made him an ideal instructor for Brun.^{11–14}

In May 1918 Brun began splinting and caring for fracture patients arriving

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at the hospital. From May 23 to June 16, Brun and Captain Harvey B Stone, MC, a surgeon, were sent to French military hospitals at Tours, Bordeaux, Lyons, and Paris and the American Red Cross Military Hospital No. 1 at Neuilly to observe the methods and equipment being used to treat face and jaw wounds. After his return and throughout the summer months, Brun handled an increasing number of maxillofacial cases in addition to his regular work in the dental clinic.^{7,15}

In his next inspection report of June 20, Colonel Fisher noted that Brun was "especially interested in doing oral restoration work."¹⁶ In June Major William C Speakman, DRC, a skilled dental surgeon who had arrived with Major Vilray P Blair's maxillofacial surgery team in April (see "Dr Vilray P Blair and Maxillofacial Surgery" below), temporarily joined the dental staff on an observational assignment until he was ordered to Lyons at the end of the month.^{17,18} In July 1918 the monthly hospital return reported that "at this date, there is a very interesting clinic for this department, consisting of battle wound face and jaw cases, through and through gunshot wounds, and cases presenting much lost substance."¹⁹



*Lieutenant B Lucien Brun doing paperwork in his quarters at Base Hospital No. 18.
Caption from note with photo reads, "Here we have the 'Dent' Man Bruno of B.H. 18—
Posing for that Celebrated Picture Cleaning up on his paper work."
Photograph: Courtesy of Brun's daughter, Lucille F Lane.*

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By mid 1918 the dental officers of Base Hospital No. 18, which became part of the Bazoilles Hospital Center in July, were experienced and well trained. The dental clinic was eventually replaced with a new clinic and laboratory that had "the most modern equipment" installed. Because of its location near the front, Bazoilles received many jaw and face wounds, and Lieutenant Brun and the new dental clinic took on the task of caring for the maxillofacial cases while the laboratory handled most of the splint work.

On September 10, 1918, now Captain Brun was appointed the supervisor of dental operations for the entire Bazoilles Hospital Center, in addition to his continuing dental duties at Base Hospital No. 18 and a growing workload of maxillofacial patients. In preparing for the upcoming Saint Mihiel offensive, the hospital commander had decided "to utilize the service in the operating room of both Dental Surgeons at this post, one for day and the other for night duty."²⁰⁻²² Brun drew the night shift on Harvey Stone's team. In a personal diary, Brun jotted down his frenetic pace during the offensive's early days:

Wednesday, Sept. 11. With Americans opening grand offensive all along line from Pont-a-Mousson to Verdun — advance had been made all along [Saint Mihiel] salient. Mont Sec has been taken. Weather conditions still very bad. Hard going for our boys. . . . Thursday, Sept. 12th. Drive continues with unabated fury & success. . . . Friday, Sept. 13th. First convoy of wounded received. Day & night teams start work. Much for me to do before starting in on night shift which runs from 8 P.M. to 8 A.M. — worked until 3:30 A.M. morning of Saturday, Sept. 14. Weather cleared up. Very damp — arose at 6:30 had bath & breakfast and then over to 46-116 and 42 [Base Hospitals No. 42, 46, and 116] where I found seven jaw cases had come in. Got work started on them. Returned at 12:30, had lunch — then to office until 4 — to bed until 6:30 supper and to operating room all night — two more convoys arrive for us. Sunday, Sept 15th. . . . To all hospitals until 12 noon . . . Large convoy arrives at 8 P.M. Up all night — 50 odd operations today — to bed at 5:30. . . . Monday, Sept. 16. . . . To other hospitals between 9 & 1. Go "on" again tonight — almost all in. Day & night for nearly four days with but little sleep.²³

Brun was treating maxillofacial cases in Base Hospital No. 46 and No. 116 as well as his own Base Hospital No. 18 and the designated specialty hospital of the Hospital Center, Bazoilles, Base Hospital No. 42, where Captain Hugh W Brent was assigned as the oral and plastic surgeon late in August. Cases were increasingly concentrated at Base Hospital No. 42 during the Saint Mihiel offensive in September, and laboratory equipment was moved there from Base Hospital No. 18. More and more, Brun's time was taken up with maxillofacial matters. On September 30 the hospital center commander formally directed Brun to assist Captain Brent with the maxillofacial cases received at Bazoilles. Brun worked heavily on these cases for the remainder of the year.¹⁵

While stationed at Bazoilles-sur-Meuse from August 1917 through December 1918, Brun and Lankford treated 3,500 officers and enlisted soldiers and 132 other patients in 6,577 individual sittings.^{9,24} Base Hospital No. 18 rapidly curtailed its activities after the armistice, closed on January 17, 1919, leaving for the United States on January 31, 1919, and completed demobilization on February 25, 1919, at Camp Upton, Long Island, New York.⁶

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*Lieutenants B Lucien Brun and Livius Lankford in the dental clinic at Base Hospital No. 18, France.
Photograph: Courtesy of Brun's daughter, Lucille F Lane.*

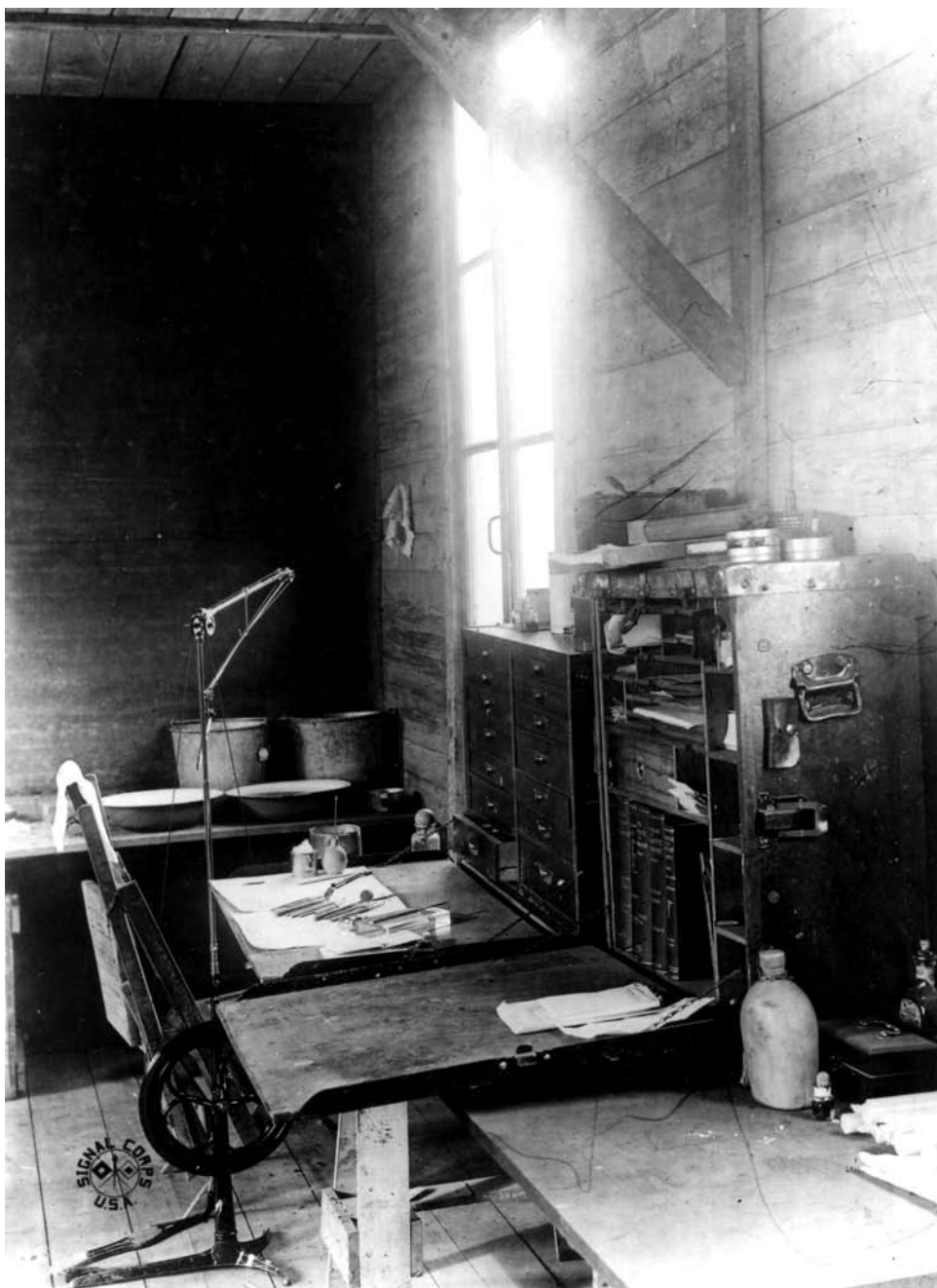
Base and Camp Hospitals

The experiences of the staff at Base Hospital No. 18 were duplicated across much of France where American hospital units were located. First Lieutenant George M Boehler, a 1908 graduate of Creighton University's College of Dentistry, assigned to Base Hospital No. 49 at Neufchâteau, wrote home that his unit was in comfortable surroundings.

My duties since arriving here have been many and varied. Besides my regular duties as Dental Surgeon, I am a Fire Marshall in one section of the Hospital Center, assist censoring mail, and last but not least, am Officer of the Day when my turn comes in my particular Unit. So you can readily understand that my time is well occupied in helping to do my bit.

The Dental Department when fully completed will be one of the important branches of the Hospital, as there is a great demand for dental service, for the "blessured" men who come here for treatment from the front, and the importance of dental attention is well understood and recognized by all the personnel of the Army.^{25,26}

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*An interior view of the dental office at Camp Hospital No. 70,
Saint Florent-le-Viel, France, 1918.
Photograph: Courtesy of the National Library of Medicine.*

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First Lieutenant Theodore V Symanski, DRC, at Camp Hospital No. 26 at the First Replacement Depot at Saint Aignan noted that many casualties passing through the command, especially those from the front, needed dental care. He wrote home that his "Dental Department" shared a temporary barracks building with the central dental laboratory in the village of Noyen, about a mile from the rest of the hospital. Combined, the dental activity consisted of 82 officers and soldiers. All of the latter were either dentists without commissions or former dental students and technicians, while all but two of the dentists were members of the National Guard or Dental Reserve Corps. Symanski judged the available equipment as excellent. Twenty-seven chairs were devoted to operative work, four to prosthetic work, and two to oral surgery. A final two were in a separate "officers' operating room." The dental laboratory could turn out two dozen dentures a day, while the chairs handled 110 to 150 patients daily. Camp Hospital No. 26 closed on June 26, 1919, "and with it both the Dental Department and Central Laboratory."²⁷

In addition to serving the large flow of replacements and casualties, Camp Hospital No. 26 itself served as a replacement pool. Requests for personnel sent to Oliver's office were filled mostly by drafts on the hospital staff. Dental personnel



*Dental Infirmary at Camp Hospital No. 26, 1st Depot Division, Saint Aignan, France.
Photograph: Courtesy of the National Library of Medicine.*

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*Dental supply room at Camp Hospital No. 26,
1st Depot Division, Saint Aignan, France.
Photograph: Courtesy of the National Library of Medicine.*

from Camp No. 26 went to several infantry divisions as well as to other posts throughout the AEF. Newcomers from the United States took their places to become acclimated before serving as replacements for line units.²⁷

Trench Mouth

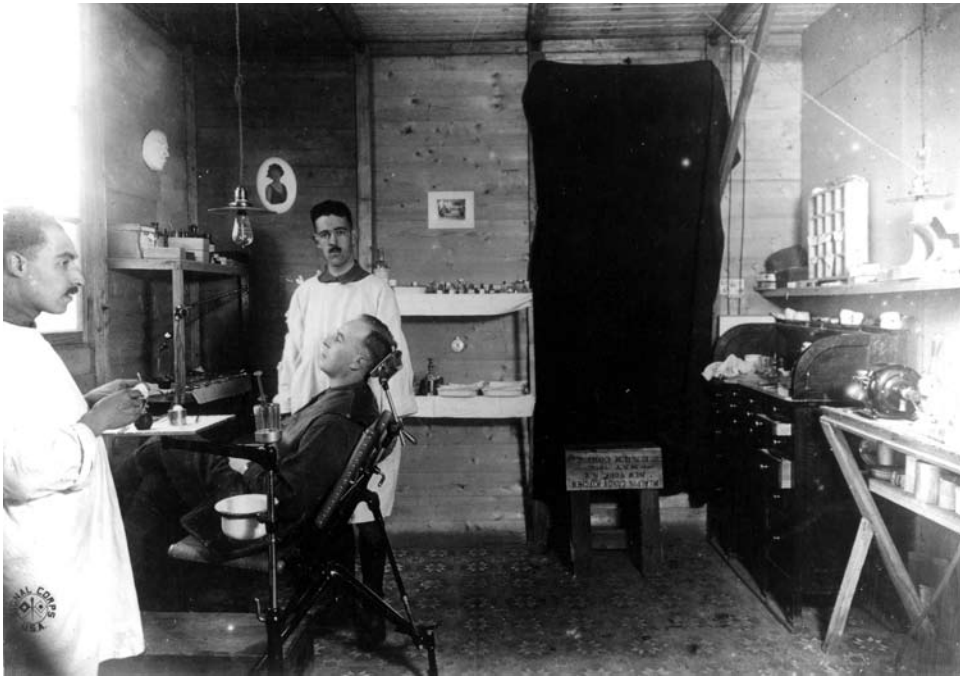
Another specialized area that formal training could not address was Vincent's Angina, or "trench mouth." In February 1918 Lieutenant (junior grade) Douglas B Parker of the US Naval Reserve Dental Corps, a dental surgeon at the US Navy Base Hospital No. 1 in Brest, France, reported that he had noted "some ten cases of Vincent's Angina," which bacterial examination confirmed. While relatively rare during peacetime, this affliction of the throat, mouth, gums, and tonsils was widespread among British and French troops in the trenches, and came to be known as "trench mouth," "trench throat," or "trench gums." By the spring of 1918, the disease was quite prevalent in the AEF's camps and training areas and resulted in the hospitalization of a large number of soldiers; one hospital alone had more than 700 cases being treated at one time. While normally not life threatening, trench mouth was incapacitating and required several days to treat.²⁸⁻³⁰

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First described by the French physician Henri Vincent (1862–1950) in 1898 and named after him, Vincent's Angina or Vincent's Disease was an ulcero-membranous disease characterized by swollen gums with a grey sloughing membrane that bled freely.^{30,31} The symptoms were described as pain in the region of the gums and teeth accompanied by fetid breath and loose or painful teeth. Gums began sloughing away, became a shiny pus color, shredded easily and bled at the slightest touch, and finally sloughing occurred to the extent of showing the spaces between the teeth where the gums ought to be.^{30,32} To prevent an epidemic, all infected soldiers had to be referred to their unit dentists, who instructed them in oral hygiene. Toothbrushes had to be cleaned, isolated, and covered after each use, and brushing itself could not abrade the gums. Alcoholic beverages were also discouraged. Finally, all eating and drinking utensils had to be cleaned thoroughly in very hot water and never shared.³¹

In May 1918 First Lieutenant John E Walker, MC, investigated the situation at Blois and Saint Aignan. Since April 26 at Blois, 25 cases had tested positive for the Vincent's organism among 3,000–4,000 troops. Several of these patients were also found to be carriers of the diphtheria bacillus. Four or five cases were considered serious enough for hospitalization. All cases had mouths that were in bad condition with calculus formation.³³

The treatment for trench mouth consisted of a thorough prophylaxis, removal of retained roots, and cavity filling. After that, the gums were treated with silver



*Dental Office at Camp Hospital No. 26, 1st Depot Division, Saint Aignan, France.
Photograph: Courtesy of the National Library of Medicine.*

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*A technician in the dental laboratory at Base Hospital No. 69, Savenay, France. 1918.
Photograph: Courtesy of the National Library of Medicine.*

nitrate solution, tincture of iodine (4%), or trichloroacetic acid. Fowler's solution was given internally in some cases, and intravenous injections of novo-arsenobenzol was used in one or two cases, but was not considered efficacious.³³

At Saint Aignan, Walker found 54 cases had been diagnosed out of 18,000 troops in the past 2 months. The men were largely transients and probably arrived with the disease already developed. In general, those from the front lines were slightly more likely to be infected. Walker concluded that the two most important factors were "a mouth condition originally bad," and "a lack of oral hygiene (toothbrush)." He also surmised that "over smoking" and the "quality of the food" played a role. In addition, he concluded that there was "no evidence of the transmission of the condition from case to case." He recommended "greater insistence upon the use of the tooth brush, even under war conditions" and "thorough cleaning up of all mouths." One possible solution to the problem was "training enlisted men to remove calculus, and to make applications to the gums, thus reserving the time of the dentist for extractions and fillings."³³

In December 1918 Captain William W Irving, Dental Corps (DC), supervising dental surgeon at Hospital Center, Savenay, recommended to Colonel Webb E Cooper, MC, the commanding officer, that medical and dental officers "cooperate" in the treatment of Vincent's, and that the cases be isolated and obliged to "use

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their own or special mess kits."³⁴

In his account of Vincent's Angina in the official history of the Army Medical Department, Lieutenant Colonel Joseph F Siler, MC, probably the Medical Department's leading medical researcher of the time and head of the AEF's Division of Laboratories and Infectious Diseases at Dijon, identified a total of 3,080 cases of Vincent's Angina and four deaths from 1917 through 1919, resulting in the loss of 35,440 days.³⁰ As to possible preventive and therapeutics measures, he concluded the following:

No specific preventive measures were known before the war and none developed during that period. It has been established that the disease is an infection; however, the method of transmission is unknown. The organisms of Vincent are constantly present where Vincent's disease exists, but are also normal inhabitants of the mouth. The important factor seems to be in the prevention of lowered local and constitutional resistance. The best results are accomplished by proper oral hygiene. . . . It has been said that a good dentist is the best therapeutic measure. Filthy mouths must be cleaned up, and gingivitis and pyorrhea alveolaris must be adequately treated, if satisfactory improvement is to be expected. Local application of drugs, curettement, and intravenous therapy are merely adjuncts.³⁰



*Dental patients' ward at Camp Hospital No. 26,
1st Depot Division, Saint Aignan, France.
Photograph: Courtesy of the National Library of Medicine.*

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Syphilis

Syphilis was always a major concern in the Army (Exhibit 14-1). After Hugh Young's first briefings on the voyage to France, Pershing successfully directed a vigorous program to repress the incidence of venereal disease in the AEF. However, syphilis remained a concern and danger to dentists because the oral cavity presents "an exceptionally fine field for syphilitic infection" and the extensive mucous surface and moisture present are "favorable to the life of the spirochaete."^{35,36} In addition, there is always "mechanical irritation during mastication," which produces abrasions sufficient for the entrance of the spirochaete. The toothbrush, kissing, unsterilized dental instruments, knives, forks, spoons, cups, glasses, and common use of pipes and cigars can all transmit the disease. Chancres can appear most frequently on the lips (usually the lower lip); the tip, dorsum or sides of the tongue; the tonsils; or even in the pharynx. The sores are usually round or oval, slightly elevated, and sharply outlined. They are not painful, but there is always bilateral lymph node enlargement. Thus, no class of professional men was "more subjected to accidental infection than the dentist."³⁵ Several of the early contract dental surgeons became infected "innocently"; others, not so innocently. In 1913 one contract dental surgeon's contract was annulled because of absence from duty caused by secondary syphilis "contracted not in line of duty." He was treated with salvarsan. When the case came up for review, the surgeon general, Brigadier General Torney, stated that "it is a well known fact in medical practice that many of the lesions of syphilis are highly infectious and the syphilitic individual is capable of infecting persons by many routes. The conveyance of the disease by dental instruments has occurred more than once." Furthermore, he said "to permit a syphilitic dentist to continue in the practice of his profession in the Army would be to subject the officers and enlisted men who come under his treatment to the constant risk of acquiring syphilis." He recommended immediate annulment of the contract.³⁷ Another dentist was diagnosed in July 1913 as having secondary syphilis following a positive Wasserman examination. It was believed he acquired it as a result of a "puncture wound inflicted with dental instrument in line of duty." He never had any symptoms of the disease and served until he retired in 1932.³⁸

Dental assistants became infected too. The case of a dental assistant at the 8th Infantry Infirmary, Camp Frémont, California, was recorded in the Army's syphilitic register: "The lesion occurred on the left thumb at the outer nail margin and was contracted while working on a patient's mouth. The initial lesion was followed in six weeks by marked secondaries and a double plus Wasserman reaction."³⁹ The "propriety of using rubber gloves when handling infected material" was stressed, as was instrument sterilization by boiling or autoclaving.³⁹

In 1917 the US Army turned to Dr Hugh Hampton Young of the Johns Hopkins Hospital, Baltimore, Maryland, and Base Hospital No. 18 to head the Urological Service for the American Expeditionary Forces in France. Young had described the problems of venereal disease to Pershing and his staff onboard the *Baltic*, and Pershing already knew that venereal disease was one of the "most important problems confronting the Medical Corps" and had adopted

EXHIBIT 14-1

SYPHILIS IN THE US ARMY

According to LF Kishler,

syphilis is an ancient disease, reportedly introduced into Europe in 1493 by the sailors returning with Columbus. It is peculiar to mankind and there is no disease with so great a variety of manifestations, nor none with a more insidious, deceptive and persistent course. There is no age, sex or physical condition which precludes the ravages of syphilis, and no tissue nor organ that is immune to its attack.

The known history of syphilis may be summarized as follows:

- 1903: Metchnikoff and Roux demonstrated animal inoculation with syphilitic tissue.
- 1905: Schaudin and Hoffman discovered the organism specific to syphilis, the *Spirochaete Pallida*.
- 1906–1907: Wasserman, Neisser, and Bruck developed the blood test for syphilis, the Wasserman test.
- 1910: Ehrlich discovered salvarsan or 606, the drug specific for the treatment of syphilis.
- 1911: Noguchi, at the Rockefeller Institute in New York, artificially cultivated the *Spirochaete Pallida*.

In 1919 the Surgeon General was deeply concerned about the high prevalence of venereal disease among US Army draftees and its effect on the civilian population. Congress passed the Chamberlain-Kahn Act, which charged the public health service with the “responsibility of organizing an effective campaign for the control of venereal diseases.” The country’s 45,000 dentists were enlisted in the fight, and a conference was held in Washington, DC, under the auspices of the National Capital Dental Society of the District of Columbia.

Data sources: (1) Kishler LF. The handling of syphilitic cases. *J Assoc Milit Dent Surg USA*. 1918;2:53–59. (2) Quetel C. *History of syphilis*. Baltimore, Md: Johns Hopkins University Press; 1992: 33–49. (3) Hirschfeld M. *The Sexual History of the World War*. New York, NY: Falstaff Press, Inc; 1937. (4) Blue R. Campaign to enlist the co-operation of the dental profession in the fight against venereal diseases. *Dental Cosmos*. 1919;61:1132.

“extraordinary measures to prevent venereal infection among his troops,” both in the Philippines and Mexico. He fully expected Colonel Young to implement an aggressive approach for the AEF.³⁹

Syphilis was not as common in the AEF as it was in the stateside Army. There were 12,680 primary admissions in the former and 51,528 in the latter.³⁰ In the American Army, the contraction of syphilis was an offense punishable by deprivation of pay and limitation of freedom until the malady was cured. For failure to report the disease and seek medical attention, a soldier was “hailed before a military court, and in case he had infected others, was sentenced to prison.”^{40,41}

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Dr Vilray P Blair and Maxillofacial Surgery

Soon after the United States entered the war, the surgeon general's office examined the challenging issue of injuries to the face and jaw that were particularly troublesome problems for the Allies and the Germans after 1914. In July 1917 Surgeon General Major General William Gorgas concluded that the Medical Department lacked the "number of general and dental surgeons sufficiently experienced in plastic and oral surgery to take care of the cases of maxillofacial injuries that we were likely to encounter." Gorgas set about securing the services of the surgeons and dental surgeons needed for this new maxillofacial service and to give all of them additional training in plastic and oral surgery (see "War-Related Dental Training on Civilian Campuses," Chapter 12). "These surgeons and dentists were to work and be trained together so that units, to be composed of a surgeon and a dental surgeon, could be formed which would give to the patients to be treated the skill of the two professions."⁴²

Gorgas formed the section of plastic and oral (maxillofacial) surgery in the new division of surgery of the head to oversee the maxillofacial service, prepare the training, and develop the policy for the treatment of such wounds among American soldiers in France. Apparently on the recommendation of Dr William Mayo of the Mayo Clinic, in late July 1917 Gorgas chose Major (later Lieutenant Colonel) Vilray P Blair (1871–1955) of the Medical Officers' Reserve Corps, then at the medical officers' training camp at Fort Oglethorpe, Georgia, to head up this effort as the chief of the section of plastic and oral (maxillofacial) surgery, and to act as the consultant to the surgeon general for maxillofacial surgery. Blair was then a leading maxillofacial, plastic, and reconstructive surgeon at the Washington University School of Medicine in Saint Louis, Missouri. In August Captain Robert H Ivy (1881–1974), Medical Officers' Reserve Corps, holder of a DDS (1902) and MD (1907) from the University of Pennsylvania, became his assistant. Working closely with then Major William HG Logan, who had just become chief of the surgeon general's new dental section in August 1917 and was himself a well-known oral and plastic surgeon, Blair and Ivy handled the selection and specialized training program for surgeons and dental surgeons in maxillofacial surgery first at Washington University on October 15, 1917, and later at the University of Pennsylvania and Northwestern University. That same year, Blair added a chapter on trauma to his already classic *Surgery and Diseases of the Mouth and Jaws: a Practical Treatise on the Surgery and Diseases of the Mouth and Allied Subjects*,⁴³ and this third edition was adopted as the manual for care of military maxillofacial cases. From the very beginning, Blair's deep personal and professional involvement in this work shaped it both in the United States and later the AEF. In the postwar years, Blair and Ivy became founders of modern American plastic and reconstructive surgery. Blair was also a driving force in the establishment of the American Board of Plastic Surgery in 1937.^{42–49}

Blair's policy for the maxillofacial service was based on two "fundamental principles": "the close cooperation of surgeons and dental surgeons"; and "the early institution and the continuous and systematic conduct of treatment."⁴⁴ To achieve this, Blair laid out three requirements:

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... first, a sufficiently large personnel to be available at every advanced and at all intermediate and base hospitals; second, a definite general plan of treatment which, instituted in the advanced hospitals, would be carried out without radical change in each of the hospitals to which the wounded would be subsequently evacuated, and thirdly, and not unimportant, suitable equipment.⁵⁰

Blair pointed out that the "proper treatment of maxillofacial injuries rests on the same surgical principles as that of wounds in any other part of the body."⁵⁰ However, this work required the special skills of the dental surgeon to be successful:

... because the proper splinting of a fractured jaw requires dental splints, or splints with dental attachment, and because few surgeons have familiarized themselves with the physiology and the special pathology of the oral structures, to do the work efficiently requires, as a rule, the cooperation of a surgeon with a dental surgeon who has made a special study of the subject.⁵⁰

He later added:

except for intermaxillary wiring, only the dental surgeon is equipped to splint a fractured jaw and it is the latter who will ultimately carry the major part of the burden in the greater number of cases, but intelligent cooperation is essential throughout the whole treatment.⁵¹

Speaking at the October 24, 1917, meeting of the Clinical Congress of Surgeons of North America (now the American College of Surgeons) in Chicago, Blair described the structure, training, and practice of the Army's new maxillofacial service.⁵² He stressed the cooperation of surgeons and dental surgeons as essential to success, and called for an end to their old antagonisms:

Of not uncommon occurrence in the present war are those distressing wounds of the face and jaw which have attracted particular attention, not only on account of the disfigurement which they cause, but even more so from the difficulty that was at first encountered in dealing with them. This difficulty is the logical outcome of an attitude that regarded dentistry and surgery as two distinct and separate professions. As long as this theory was allowed to dominate practice, a man who had an extensive injury of the face and jaw-bone had about as much chance of an ideal result as had the man with an open fracture of a limb in the days when the physician and the bone-setter could find no common ground upon which to meet. The bone-setter, and the physician who refused to recognize the surgeon, are of the past, but the surgeon and the dentist in their relation to each other only too frequently perpetuate the agnosticism of those older practitioners.⁵²

Drawing heavily on the existing wartime experience of Varaztad H Kazanjian, George B Hayes, William S Davenport, and others, Blair, Ivy, and Logan planned to assign what Blair called "units," a surgeon and dentist qualified in maxillofacial surgery who had trained and worked together, to each evacuation and base hospital in France, "so that from the very first each of the patients will receive the best that surgery has to offer." In addition, Blair was to take another group of units to France to study French and British techniques and conduct "special work." By the

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time the training was completed in the United States in March 1918, 164 surgeons and 123 dental officers had taken the courses, but 40 of them were never assigned to either maxillofacial work or to the AEF.^{49,52,53}

The American Expeditionary Force's Maxillofacial Surgery Service

While the maxillofacial medical and dental personnel were selected and trained in the United States, the AEF confronted the immediate need to treat jaw wounds and injuries. Oliver and the chief surgeon's office considered selecting a limited number of base hospitals that would be designated "jaw centers" and be provided with the trained personnel and special equipment needed to handle maxillofacial cases. Six hospitals were tentatively selected and then held in reserve for the most severe cases requiring evacuation to the United States: Base Hospital No. 18, Bazoilles (the Johns Hopkins Hospital Unit, Baltimore, Maryland); Base Hospital No. 15, Chaumont (Roosevelt Hospital Unit, New York City); Base Hospital No. 21, Dijon (Washington University School of Medicine Unit, Saint Louis); Base Hospital No. 26, Angers (University of Minnesota Unit, Minneapolis, Minnesota); Base Hospital No. 6, Bordeaux (Massachusetts General Hospital Unit, Boston); and Base Hospital No. 8, Savenay (Post-Graduate Hospital Unit, New York City).⁵⁴⁻⁵⁶

When the Army Sanitary School opened at Langres in December 1917, the dental section's curriculum included instruction in war dentistry and "a practical knowledge of face and jaw surgery." Much of latter instruction fell to First Lieutenant William H Potter, an experienced former professor of oral surgery at Harvard Dental School who also knew British and French practice. However, it became clear that more advanced training in "oral, plastic and prosthetic surgery" would be needed once American forces were fully engaged in combat operations and face and jaw wounds became more numerous. Thus, the American Red Cross Military Hospital No. 1 (formerly the American Ambulance) at Neuilly, was again selected as the training site for the postgraduate course because its staff, with George B Hayes and William S Davenport, had extensive experience treating such injuries since 1914 (for more information, see "The European War: The American Ambulance, Neuilly, Paris, France, 1914-1916" and "Opportunities and Missed Opportunities" in Chapter 11). A qualified faculty was easily identified and a full curriculum developed. The opening of the school was initially set for January 1918, but was then deferred until April 1. The massive German offensive against the British in Flanders that began on March 21, 1918, forced the indefinite postponement of the school's opening because all hospitals in the Paris region and forward were overwhelmed with Allied casualties. Continuing German operations that spring reached the Marne in late May and prevented the school from ever opening. By then, the arrival at Brest, France, on April 18 of Blair and his carefully selected oral and plastic surgery unit of 18 surgeons and 15 dental surgeons, all specialists in maxillofacial surgery, greatly diminished the need for the school at Neuilly.^{54,57,58}

In the interim, however, various initiatives were undertaken on both sides of the Atlantic to train additional Medical and Dental corps officers in oral and plastic surgery. Apparently, Blair, Ivy, and Logan carefully reviewed those personnel passing through the maxillofacial training programs and identified the best

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*Dental clinic at Base Hospital No. 57, Paris, France, 1918.
Photograph: Courtesy of the National Library of Medicine.*

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candidates for continuing involvement once they had moved to France. In at least one instance, Lieutenant Colonel Walter R Parker, chief of the section of surgery of the head in the Office of The Surgeon General, informed the commander of Base Hospital No. 3 (Mount Sinai Hospital Unit, New York City) at Vauclaire, France, in Base Section No. 2, that Captain Robert T Frank, Medical Officers' Reserve Corps, the staff surgeon in oral and plastic surgery, and First Lieutenant Jacob Asch, DRC, dental surgeon, had been "nominated to do the oral and plastic surgery" for his hospital. Parker said that "it is suggested that it would be desirable, if possible, to give these men an opportunity to see some of the plastic and oral surgery that is now being done abroad." He suggested that they be allowed to visit one of the special British or French hospitals, "if only for a few days," so that they would be better able to care for such cases.⁵⁹ While Asch had attended the special training at Washington University during October 1917, there was no indication of any such training in Captain Frank's case. However, the other dental surgeon of Base Hospital No. 3, First Lieutenant Leo Stern, DRC, had also completed a 2-week special maxillofacial surgery course at the University of Pennsylvania in December 1917 before being ordered to active duty. Both Asch and Stern later attended the Army Sanitary School during April and June 1918, respectively, and received additional special training in plastic and oral surgery. Dr Frank was detached and sent for temporary duty to Base Hospital No. 15 at Chaumont, where he remained until December 1918. Asch and Stern served as the dental surgeons on duty at Base Hospital No. 3 until the hospital closed down in February 1919, after which they returned to the United States.⁶⁰⁻⁶³

Soon after his arrival in France, Blair was named AEF senior consultant in maxillofacial service and was provided with special orders from General Pershing, the AEF commander, "which swept away any difficulties I might otherwise have had."⁴⁸⁷ Following a period as casuals observing French and British field hospitals, the members of Blair's unit spent an intensive 10-week period in England devoted to training in the reconstruction of head and face wounds. After the training, the men returned to France and were assigned to AEF hospitals. As Blair originally envisioned, one maxillofacial unit composed of a surgeon, surgical assistant, and dental surgeon was to be positioned in each evacuation hospital to initiate the early treatment that was seen as critical. A unit was also sent to each base hospital each base hospital for continuing care, but no such teams were planned for the mobile and American Red Cross military hospitals. The AEF's early plans for specialized maxillofacial service at selected base hospitals also soon disappeared under the stress of operational requirements. Careful planning gave way to a system of personal arrangements agreed to among Blair, Colonel William Keller (1874-1959), the dean of the Medical Corps' surgeons and the surgical consultant to the AEF, Colonel Oliver, and the individual hospital commanders who selected the best-qualified and most-interested personnel from their staffs for maxillofacial work. At the same time, Oliver assigned qualified dental surgeons to each base and evacuation hospital "to care for prosthetic and splint work," but they were also often diverted to other duties.^{49,52,54,64}

After reaching an agreement with Keller and Oliver in a June 11, 1918, memorandum, Blair further fleshed out this concept with a set of recommendations on

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early treatment and evacuation policy, as well the placement and selection of surgeons and dental surgeons for the AEF's maxillofacial service. This included "specially qualified teams" located in all evacuation hospitals and in 17 base hospitals and hospital centers throughout the advance, intermediate, and base sections of the services of supply and a "reconstruction center" at Vichy with the specialized Base Hospital No. 115 that was coming from the United States.^{54,64,65} One of the reasons that Vichy was selected was that French Maxillofacial Hospital No. 45 was also located there. Captain Fernand LeMaitre of the French Medical Corps, the surgical chief of at Hospital No. 45, had extensive experience in caring for facial wound cases and had developed new techniques and appliances. LeMaitre was willing to share his knowledge and cooperate with American dentists.⁶⁶

On June 26 Blair followed up his recommendations of June 11 with another memorandum to the chief surgeon outlining the treatment and evacuation policy to be adopted for specific cases, focusing treatment of the most serious cases at Base Hospital No. 115 at Vichy. Again, he emphasized that "these cases shall be attended by the surgeon and the dental surgeon jointly."⁶⁷

In 1919 Blair reflected on how the new AEF maxillofacial service eventually developed:

Shortly after we arrived in France, a senior consultant for maxillofacial surgery for the American Expeditionary Forces was appointed [Blair], and a policy for the care of these cases outlined, which differed little from the plan contemplated by the Surgeon General. Information as to the general plan for evacuation and treatment of these patients was sent out. France was divided into seven parts, to each of which a local or area consultant for maxillofacial surgery was appointed. In each American hospital center the cases were concentrated as far as practicable in one hospital, where they were attended by a local consultant for the center, in cooperation with special selected dental surgeons.^{50(p326)}

However, it took considerable time and effort and some changes in the original plans for this to come to fruition. The urgent need for surgeons to treat the surge of casualties generated in the heavy defensive fighting around Château-Thierry and along the Marne River (which blunted the German offensive toward Paris), and the subsequent Allied summer offensives, often required that the surgeons be diverted for more general surgical work.^{50(p326)} Blair explained:

The atmosphere of war, in spite of intense concentration, is one of distraction. All plans of specialization are more or less ideal, and it takes time to put any subordinate plan into operation, especially if it is far-reaching in its application. Each hospital organized in the Surgeon-General's Office had attached to it a surgeon and a dental surgeon designated for this work; but in the earlier part of the severe fighting, all specialization was overshadowed by more vital problems. It is no secret that, owing to the lack of transportation, we were short of surgeons and dental surgeons in the American Expeditionary Forces, and that at Chateau Thierry most of the surgical consultants were ordered to form general operating teams, and they stood twelve hour shifts at the table at any hospital where they could find space; while the dental surgeons were often giving anesthetics, carrying stretchers or giving first aid treatment.^{50(p326)}

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Blair later added that circumstances overwhelmed his plans but not his personnel:

. . . failure of realization to the fullest extent was not due to want of cooperation of the medical or dental professions, either in civilian life or in the Army, but to the exigencies of the war. Where the plans actually fell short, disaster was averted by the splendid spirit of the personnel who at any time and anywhere made ingenuity and enthusiasm compensate for material and conveniences when either or both of the latter were lacking.^{51(p379)}

A member of Blair's group, First Lieutenant Arthur Lankford, DRC, was stationed at American Red Cross Military Hospital No. 1 at Neuilly and provided a graphic description of the role of the dentist as an anesthetist during the battle of Château-Thierry in 1918. Lankford states that the dentists were "giving the anesthetics and there were all kinds of wounds," not just jaw wounds:



The American Red Cross Military Hospital No. 1 at Neuilly-sur-Seine (Paris), the former American Ambulance (American Hospital), came under Army Medical Department leadership from 1917 through 1919 and supported the American Expeditionary Forces.

Here, in 1914, Doctors George Hayes and William Davenport first established their maxillofacial dental clinic to treat wounded French soldiers and in 1918, along with Army plastic and dental surgeons, treated American soldiers with maxillofacial injuries.

Photograph: Courtesy of Dr Arthur Lankford.

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I think it was eight tables in our operating room . . . and they were lined up like this with wires running across the top. They'd cut off a leg or an arm to be put in a thing on this wire, and give it a push and push it over, and by the time we had been there for two or three days, blood was an inch or so deep all over the tile floor. . . . We had stretcher bearers coming in, great big strong men. When they came to that door to bring a patient in and saw the arms and legs hanging up on these wires, and the blood all over the floor, walking through it, some of them just fainted, just keeled right over

When they first came in, I took over and took care of the bone. You see, you can't build unless you've got something to build on. I would get the bones set in the proper position, get the splints made. I had to design all kinds of new kinds of splints, we had never seen anything like it before, and get the jaw stabilized, and then when the time came, we worked in pairs, the general surgeon and dental. Then when I got that all fixed, the framework of the bone for the jaw, then the surgeon would take over and I would be the assistant, and we would do the plastic work.

I would go to sleep just sitting up there. I just couldn't stand it any longer. Then by that time some team would come in from someplace and take over. I would go back to my room, bed, and I would just fall on the bed with my clothes on, and too sleepy and tired to get them off. And I would lay there maybe for a day and a night without waking up, just like I was dead. And then I would have to get up, take a bath, and wash and come on back to the operating room and start over again. That was how busy we were at that time.⁶⁸

After the war, Dr Lankford, a 1912 graduate of the Baltimore College of Dental Surgery, resumed his dental practice in Baltimore until his retirement in the mid 1960s. He died in November 1984, at the age of 96.⁶⁹

The experiences of trench warfare, with the "wholesale destruction of tissue by an infinite variety of projectiles and the ever-present dangers from battlefields planted with pyrogenic microorganisms through centuries of fertilization with manure," had changed the routine treatment of wounds previously found to be satisfactory. The majority of wounds caused by pieces of shell and shrapnel were infected, and even rifle wounds were "rarely aseptic." Accordingly, all wounds were treated with antiseptics with "Listerian rigor," as if all were infected. Dakin's solution (an aqueous solution of 0.5% sodium hyperchlorite) was used to irrigate the wounds. The free use of antitetanic serum largely prevented the "horrors of tetanus."⁷⁰ The antitetanus vaccine was given intramuscularly as quickly as possible after the receipt of a wound. The usual British dose was 500 units, and each British soldier was given a "field card" as part of his equipment, noting the fact that he had received the injection. When the patient was evacuated to a base hospital, he received a second injection of 500 units 7 days after the first, to be repeated every 7 days until 2,000 units had been given.⁷¹

Due to continuing heavy demands resulting from the summer's defensive and offensive operations, it took longer than originally intended to get the maxillofacial service up and running. The service had begun its work in evacuation and base hospitals, as per original plan, and where possible, teams were added to the 12 far-forward mobile hospitals (mobile hospitals nos. 1-11 and 39) that were shifted

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along the front to sectors of the greatest demand. If possible, a team consisting of a surgeon, surgical assistant, and dental surgeon were assigned to each evacuation hospital, with the surgeon in charge of the team. The dentist did the splinting or wiring of the jaw fractures, working in cooperation with the surgeon. However, the plan soon proved impractical because not enough teams could be formed in the United States for deployment to France, and the necessary specialized equipment that was required was either lacking or never reached the advanced hospitals. Many of the jaw wounds were also not properly classified in the forward triage; consequently patients were not sent to the waiting teams at the designated specialty base hospitals. Moreover, as the official history of maxillofacial surgery emphasized, the basic function of the advanced mobile hospitals close to the front lines was:

to prepare patients for evacuation to the rear, it was rarely possible to make either a segregation or a selection of types of cases. Early treatment of a special character by those qualified to administer it was not subordinated, likewise, to this prime military necessity.^{44,72-74}

Blair and Oliver took much of the responsibility for getting the right personnel in the right places before the maxillofacial service could really become effective. In late June Blair resurrected the concept of a special 2-month training course "to provide facilities for instructing certain dental officers in the technique of the dental part of maxillo-facial surgery" at American Red Cross Military Hospital No. 1. Although this training scheme was approved and apparently started by July 17, Blair informed Oliver that "at present, Paris looks difficult as an instruction center."⁷⁵⁻⁷⁸

Following his inspection tour to many of the base, camp, and evacuation hospitals then in operation, as well as to Mobile Operating Unit No. 1 and No. 39 and Field Hospital No. 23, 2nd Division, Blair forwarded a "future work plan of the Maxillo-Facial Service" to Brigadier General Ireland, the chief surgeon, on July 18, 1918. The policy agreed to by Oliver and Keller was that "provisions have been or will be made to treat these cases in every hospital to which they first come or to which they are evacuated, so that early and continuous treatment will be assured."⁷⁹ To support this promise, Oliver and Blair agreed on coordinating the assignments of the most qualified individual dental surgeons to base hospitals and to mobile hospital and surgical units. There they would be available for jaw splinting and emergency dental work, and they could be used as anesthetists when not so engaged. This often proved to be demanding duty. Most times the dentist was on call 24 hours a day, frequently working without breaks. The care of the soft parts and the general supervision of a case were the domain of the general surgeon, who had no special training in plastic work. Although not ideal, this system produced some very good results and was the best that could be done under the circumstances.^{72,78-82}

Based on his inspection visits to numerous base hospitals, and perhaps also due to troubles with his training plan at Neuilly, Blair noted in a July 18 letter to the chief surgeon that many of the resident dental surgeons had serious professional weaknesses in maxillofacial procedures and care. He recommended that dental surgeons currently lacking the necessary professional skills in the maxillofacial service be assigned for temporary training at those hospitals with surgeons who were already skilled at handling such cases:

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At certain Base Hospitals that have been in service in this country for a long time, the dental surgeon is not, either for want of experience, inclination or special training, at present fitted to do the dental part of the Maxillo-facial service in the most desirable manner. It is not desirable, if it can be avoided, to absolutely displace those men who have endured the waiting period, with the expectation or hope that some of this work would eventually come to their care. . . . It is believed that any discontent that might arise from such a move might be avoided by assigning those dental surgeons who have suitable academic qualifications temporarily to one of the special hospitals of the Maxillo-facial service, to later be returned to their stations when it is adjudged that they are fitted to care for the dental part of the Maxillo-facial service.⁸⁰

After he had been in France for several months and had completed his inspections, Blair developed standard guidelines for surgeons and dental surgeons handling maxillofacial cases that were issued in bulletins and circulars of the chief surgeon. The guidance laid out eight essential principles to be followed:

1. All maxillofacial wounds shall undergo thorough mechanical cleansing.
2. There shall be no or only minimal debridement of face injuries.
3. No bone fragment having any soft tissue attachment shall be removed.
4. Immediate steps shall be taken to arrest hemorrhage, and to prevent secondary hemorrhage.
5. There shall be immediate fixation of all jaw fractures.
6. Adequate inferior drainage shall be established in all fracture cases.
7. As much primary suture of face tissues shall be done as is consistent with good surgical principles.
8. Cases shall be evacuated to the base hospitals as quickly as possible.^{65,72,83}

In its guidelines on debridement and primary suture, the directives ran counter to the surgical principles used in the AEF, but for good reason. Major George C Schaeffer, MC, the maxillofacial area consultant for the hospitals at Toul, Bazoilles, Vittel, Chaumont, Rimaucourt, and Langres, a surgeon at the Justice Hospital Center at Toul, and Blair's assistant, pointed out why:

In the handling of face cases there were two reasons why we should not follow these general rules: In the first place, thorough debridement of all face injuries would have meant the sacrifice of an immense amount of facial tissue which never could have been adequately replaced, and which, if removed, would have necessitated a great amount of unsatisfactory secondary plastic surgery. In the second place, it was shown that there was practically no danger from gas infection in face wounds, no case to my knowledge having been reported.⁷²

On August 21, 1918, Blair recommended that all face and jaw injuries reaching the Hospital Center at Bazoilles, France, be concentrated in a ward at Base Hospital No. 42 of that center, where Captain Hugh W Brent, Medical Reserve Corps, was in charge of the surgical care. Captain Brent had received his orders on March

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30, 1918, to join Major Blair in Hoboken, New Jersey, for transportation to France "for duty at special English or French hospitals to study methods preparatory for future assignments," and was one of Blair's original team members. He completed 3 months' work in the British Jaw and Plastic Hospital at Sidcup, England, "a special course" in the United States, and was "sympathetic with and conversant with the aims of this service."^{84,85} In addition, Blair put First Lieutenant B Lucien Brun, DRC, stationed at Base Hospital No. 18 (The Johns Hopkins Hospital unit), in charge of the "splinting of these cases" in cooperation with Brent. Brun had "special qualifications" for this work and had observed its application in Allied jaw hospitals in May and June. Blair believed that this arrangement would "simplify the problem of equipment and of dental mechanic" and would add greatly to the "efficiency of the Maxillo-Facial Service of that Center."⁸⁶ Working under Brent, Brun circulated among base hospitals 18, 42, 46, and 116 in the Hospital Center, Bazoilles, which treated maxillofacial cases. His more modern dental clinic and laboratory apparently fabricated all of the special splints that Brun then applied (see "Dental Work in a Base Hospital" above).²³ In his endorsement to Blair's memo, Colonel James D Glennan, MC, in the chief surgeon's office, made it clear that the commanding officers of the hospital centers could transfer personnel among the center's various hospital units and organize these "more or less specialized" units "as they see fit."⁸⁷ In other words, they were not required to establish wards and assign staff only to treat specific cases.

Maxillofacial cases evacuated to the Paris District were treated at the American Red Cross Military Hospital No. 1 at Neuilly, which had specialized in these cases since 1914 under Doctors George B Hayes and William S Davenport. The hospital, which had been under the supervision of the AEF chief surgeon since July 1917, now had both Army surgeons and dental surgeons on the staff to work under Hayes and Davenport. Other cases that could not be treated in the hospital in which they were initially admitted could be evacuated to a base hospital of a hospital center where there was a maxillofacial surgeon, or to Base Hospital No. 115 at the Vichy Hospital Center (which theater medical and dental personnel were operating pending the arrival of the unit from the United States in August or September 1918). Maxillofacial cases requiring only "occasional surgical or dental supervision" were sent from the base hospitals to convalescent camps to await further examination or operation.⁸⁸⁻⁹⁰

Oliver and Blair took advantage of the lull in American operations in late August and early September, prior to the Saint Mihiel offensive, to adjust the service to support the upcoming operations. Blair later commented that "after August 20, there was a breathing spell, during which this service really got on its feet; and from the Battle of the Argonne, September 25, it was on the job and delivering the goods at all stations."⁵⁰

After months of effort, Blair finally obtained approval for the formal appointment of seven local, or area, consultants for maxillofacial service, who would be responsible for overseeing the maxillofacial surgery in the assigned hospital centers and base hospitals, as well as for handling surgical cases themselves.^{50,91} On September 20 Blair appointed the seven consultants, each stationed at a hospital center, and a practicing surgeon, to oversee maxillofacial cases in the advance, intermediate, and base sections of the services of supply and the Paris region.⁹¹

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*Three soldiers with splints, Base Hospital No. 6, Bordeaux, France.
Photograph: Courtesy of the National Library of Medicine.*

Four days later, he sent each of the area consultants a more detailed letter laying out their responsibilities for “facilitating the coordination of the dental and surgical work in this service, and this service as a whole to other surgical services; by doing this to bring this service to its greatest efficiency.”⁹² Major George C Schaeffer, MC, maxillofacial consultant for the zone of the advance, advance section of the services of supply, and the Toul Hospital Center, described the obstacles that he had to overcome to develop a functioning maxillofacial service:

... it was my duty to organize our forces and resources for the accomplishment of our aims. Our forces in surgeons and dentists were meager, and our resources in materials were still less. On my first visit to the advance hospitals I found practically no plastic surgeons, only a limited number of dentists, and no equipment for caring for face cases. It was necessary to secure dentists to supply the hospitals that were without them. This was done through the chief dental surgeon of the A.E.F. [Oliver]. Directors of surgery and commanding officers of hospitals had to be shown the necessity of having some systematized plan for handling our cases. They had to be convinced of the wisdom of the maxillofacial rules of treatment, and as these differed so essentially from those governing other cases, this was no mean task. It was only with difficulty that many of them were induced to consent to calling in the dentist to help splint jaw cases, but it was very gratifying on later visits to find dentists and surgeons working in close cooperation.^{72(pp859-860)}

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On the same day that he secured the appointment of the local consultants, Blair wrote to Colonel Walter Parker in the surgeon general's office to update him on the progress of the AEF's maxillofacial program. "If I were a committee I would report progress," he opened, "you know what that means." He noted some of the problems affecting the program, especially in the area of evacuation, and lamented that "they have recently changed the general evacuation order so that cases cannot be kept over three months."⁹³ Blair remained optimistic about his work and rejected ideas about returning to the United States:

I believe that if we can get the service established on the basis of the present recommendations that we can retain 75% of these cases here for active duty, and save a large amount of recovery time on all. It was the hope of doing this that made me consent to come over.⁹¹

On October 4, 1918, the AEF Office of the Chief Surgeon issued Circular No. 50, which laid out the basic policies for handling maxillofacial cases:

Cases evacuated to the Paris District will be treated at the American Red Cross Military Hospital No. 1. Other cases that cannot be treated in the hospital in which they are situated may, on request of the local or senior Consultant in Maxillo-facial Surgery, be evacuated to a base hospital or hospital center where there is a maxillo-facial service, or to Base Hospital No. 115, Vichy.

Maxillo-facial cases requiring only occasional surgical or dental supervision may be sent from base hospitals to convalescent camps to await further examination or operation.

No Maxillo-facial case should be evacuated to the United States until the patient can open his mouth sufficiently and has the pharyngeal muscle control necessary to obviate the danger of aspiration during sea sickness.

Cases that have been recently repaired should be retained in hospital until the sutured wound is safely healed.⁸⁸

All of the work done by Blair and Oliver eventually paid off. After completing a 4-day tour of advanced hospitals in the First and Second US Armies, Blair, now a lieutenant colonel, wrote to Oliver on October 26:

I was extremely well pleased with what I found and believe that I can safely say that this service is established there and is a success. With very few exceptions the Surgeons and Dental Surgeons are working in hearty cooperation and the cases are coming back splinted, drained and with what repairs of the soft parts which at the time were indicated.⁹⁵

The next day he wrote to the chief surgeon of the AEF, saying that existing instructions already called for early care of maxillofacial cases "by a surgeon and a dental surgeon jointly." Blair noted that "wherever this plan is in operation this service is being conducted on a very high plane of efficiency and it is believed that this efficiency cannot be accomplished in any other manner."⁹⁶ Wartime experience

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confirmed Blair's two "fundamental principles" of early and consistent treatment by a surgeon and dental surgeon team.

Of the 2,000 to 2,500 cases of jaw and face injuries among the American wounded in France, Oliver estimated that two thirds were treated in hospitals in France and returned to duty. Only the most severe cases that required extensive reconstructive surgery, had a recovery time exceeding 4 months, and were deemed unfit for additional duty were to be evacuated to the United States beginning in October 1918. In all, a total of 694 patients were transferred by the time the last evacuees arrived in 1919. At first they went to General Hospital No. 11 at Cape May, New Jersey, for specialized maxillofacial care. When that hospital could no longer handle all the cases, maxillofacial centers were also set up at Walter Reed General Hospital (under Lieutenant Colonel VP Blair and Robert H Ivy upon their return from France in 1919); General Hospital No. 2 at Fort McHenry, Baltimore, Maryland (under Major George C Schaeffer, MC, from the Justice Hospital Center at Toul, upon his return in 1919); and General Hospital No. 40 at Saint Louis, Missouri.^{44,65,67,97-104} Blair also later worked with maxillofacial patients and as a consultant at the station hospital at Jefferson Barracks near Saint Louis, which took over patient care when General Hospital No. 40 closed.⁴⁸

In addition to a lack of personnel and the press of operational demands, the AEF's maxillofacial service suffered severely from the need of special equipment, of which little ever arrived in France and was delivered to the teams. Blair realized that "shells and food take precedence over other things," which forced his surgeons and dentists to use "their wits."⁵⁰

To the credit of our dental surgeons, they used their wits, and by piecing out our own supplies with what the chief dental surgeon could obtain from the French; by beating two franc pieces into splints; by robbing the shell-cut telephone wires, and by cutting meat tins into splints, from the beginning of the Argonne there were few patients who reached the base hospitals unsplinted.^{50(p326)}

Major George C Schaeffer, MC, one of the area maxillofacial surgical consultants, fully agreed:

The ingenuity of the American dentist is such that he can be trusted to find some way out of almost any difficulty, and the lack of equipment and materials never daunted him. In the preparation for another war, should such a misfortune befall us, I have no doubt that some standardized method of procedure will be adopted and carried out; but should we ever be caught again as unprepared as we were this time, it is very comforting to know that we have dental men who can be depended on to meet the emergency as efficiently as they did in France during the later months of the war.^{69(pp858-859)}

Base Hospital No. 115: the Special Head Hospital

Base Hospital No. 115 was originally organized in February 1918 as part of General Hospital No. 11 at Cape May, New Jersey. It was under the direction of the surgeon general as a "Special Head Hospital" intended to care for eye, ear, nose, throat, brain, and maxillofacial cases. The hospital was staffed with specialists and equipped as a base hospital, but was provided with all the additional

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equipment and supplies required for its special work. The AEF called the hospital to France in May 1918, but it shipped to England and France in a piecemeal fashion and did not reach France until August and Vichy until early September. At Vichy, Base Hospital No. 115 joined Base Hospital No. 1 (Bellevue Hospital, New York) and No. 19 (Rochester, New York) and Auxiliary Hospital Unit D (Louisville, Kentucky) in the Hospital Center. No. 115 took over the Hotel Ruhl, a 9-story concrete building then reputed to be the tallest building in France, with a maximum capacity of 1,657 beds (which also made it the largest hospital under one roof in the world).^{105(pp618,621,732,733)106,107}

Awaiting the arrival of Base Hospital No. 115, Blair and Oliver assigned Major Stewart D Ruggles, DC, and Captain Thomas M Terry, DC, both from Blair's original group, to Base Hospital No. 1 and the dental department at the Hotel Ruhl beginning July 19. During an inspection in August, Colonel Henry C Fisher, the AEF's general medical inspector, reported that Ruggles had started a dental department in the hotel "using some of his own instruments and those of Base Hospital No. 1" and that "a great deal of jaw surgery is being done." On August 30 Blair recommended that the surgical part of the maxillofacial service in Base Hospital



The Hotel Ruhl in Vichy, France, housed Base Hospital No. 115, the Medical Department's special head and maxillofacial hospital unit, from September 1918 until February 1919 when it closed.

Reproduced from: Clarke CW. A History of U.S.A. Base Hospital No. 115, A.P.O. 781, A.E.F., Vichy, Allier, France. Memphis, Tenn: Toof; 1919.

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No. 115 be under Captain Henry Dunning, MC, assisted by Captains Justin W Waugh and Harry B Huver of the Medical Officers' Reserve Corps, who were members of his original team like Ruggles and Thomas.⁹⁰ By the time the full 115th reached Vichy, Ruggles and Terry already had a significant dental and maxillofacial practice in progress.^{106,108,109} On September 20 the effectiveness of the maxillofacial care at Vichy was greatly enhanced when Major Robert H Ivy, Blair's assistant in the United States who finally arrived in France, was assigned to the Hospital Center as the area maxillofacial consultant and a resident surgeon stationed at Base Hospital No. 115.^{91,107}

Operational necessity soon took precedence over long-laid plans for the maxillofacial rehabilitation center. The influx of wounded soldiers resulting from the Meuse-Argonne offensive, combined with the arrival of only 10% of the needed specialized equipment and supplies, soon ended any thoughts that Base Hospital No. 115 would be able to focus solely on the care of head and maxillofacial cases.^{49,105(p733),106} The outcome was lamented in the base hospital's history:

... it soon became evident to the staff of the hospital that the institution would not fulfil the purposes for which it was intended, namely to function as a special head hospital. The large majority of head cases coming to the Center were sent to No. 115, but the bulk of patients admitted were the usual variety of medical and surgical cases. Very good eye and ear, nose and throat clinics were built up in the hospital, and a very active maxillo-facial service was maintained, thanks to the interest of Lieutenant Colonel V.P. Blair, the Chief Consultant in Maxillo-Facial Surgery for the A.E.F., but for a variety of reasons, preventable and otherwise, special cases were not routed to No. 115 from other hospitals in the A.E.F. in any considerable numbers. It is a source of satisfaction to the organization that it was able to handle efficiently the large number of cases of a character different from that which its personnel was specially qualified to treat.^{106(p23)}

A dental surgeon's experience at a hospital such as Base Hospital No. 115 differed mostly in the severity of cases. Major Ruggles, DC, a 1896 graduate of Northwestern University Dental School, worked with jaw injuries at the hospital and recalled that longer, more complex care was required to assure that the best work possible was done on maxillofacial cases. In the month of September 1918, he treated 135 cases, including 50 fractured jaws and 60 gunshot wounds of the mouth. Unlike his British colleagues, he felt no pressure to return the soldiers to duty as fast as possible. Rather, he took the time necessary to do the most thorough and cosmetic job possible while trying to enhance patient morale, which he thought could be accomplished by the hospital facilities and the "earnest and capable men" engaged in the work.^{26,97,98}

Ruggles described how the typical case was handled:

Each case was taken up in accord with the plan devised by the section of maxillo-facial surgery. The routine work of records, X-ray and diagnosis followed as soon after the patient's arrival as was consistent with his condition. The case was gone over with the surgical staff, and any surgical work such as curettements, extractions, removal of foreign bodies was done under ether before the splinting was undertaken. All teeth in the line of fracture, or so injured as to cause trouble later were removed except when it was imperative to retain them for a temporary purpose. This applied to unattached

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bone. Then free drainage was established at the most dependent point. Hemorrhage was not a serious factor, except in badly infected cases. Pneumonia developed in but two instances. Both of these favorable conditions were attributed to the rigid mouth requirements of our army, and a regular hygiene insisted upon from the beginning of the treatment. Just as the patient was able to endure the ordeal, impressions were made in modeling compound, each section separately, then assembled anatomically. From these, wax impressions were made, the splints cast in maxilor [sic], a silver-copper alloy, used by the French.^{49(pp997-998)}

Feeding maxillofacial patients was also a major consideration, and Ruggles explained how it was done at Vichy:

Upon entrance all fracture cases were placed on a liquid diet consisting of soup, porridge, cocoa, eggnog, grape juice, and milk when obtainable. Five feedings a day were given. All patients with jaws closed were kept on liquids, though many appliances permitted of semi-solids for which we were glad. The dietician received regular daily reports and prepared meals according to it. A special meat grinder was installed for preparing semi-solids, thus allowing vegetables and meats to be added to the diet list. At first a loss of weight was quite apparent, but after the third week the gain was marked.^{49(p999)}

The Hospital Center at Vichy and Base Hospital No. 115 treated 505 maxillofacial cases between September 12, 1918, and January 18, 1919, when the last case was ready for evacuation. Of these cases, 145 were of the soft tissues only, and 159 involved maxilla, mandible, or both and the malar bone. During this same period, Base Hospital No. 115 performed 137 operations on maxillofacial patients, 72 of which were for curettement and drainage of jaw fractures.¹¹⁰

Treatment of Jaw Fractures: Kazanjian's Technique

In June 1918 Major William C Speakman, DC, a well-known oral surgeon, traveled to Base Hospital No. 20 (Harvard Unit; British Expeditionary Forces General Hospital No. 22) at Etaples, France, to observe Dr Varatzad H Kazanjian's (1879–1974) technique for treating jaw fractures. Upon his return, Speakman described Kazanjian's pioneering work in detail. A small percentage of facial wounds could be immediately sutured (eg, those that were not complicated by the fracture of the underlying bone and were seen immediately after the injury). Kazanjian's usual treatment was first to allow the patient to recover from the shock, permitting the tissues to drain themselves. Then he removed all teeth and roots in the line of fracture and brought the fractured portions into normal apposition by means of splints specially designed to suit each case. In cases where there was considerable bone loss, Kazanjian substituted the missing portion, at least temporarily, with a vulcanite appliance. Where the bone loss was great and a plastic operation was necessary to supply muscular tissue, he made the vulcanite appliance somewhat larger than the portion actually lost in order to compensate for the contraction of the scar tissue later on. He performed his plastic operations with these enlarged vulcanite appliances in the mouth, permitting them to remain while repair was taking place. He made the appliances in two or three sections, which could be

removed one at a time without interfering with the repair of the tissues. Their removal made it possible for the mouth to be cleaned periodically.¹¹¹

For maxillary jaw fractures, Kazanjian devised a head cap made of gutta-percha, molding it across the forehead and down each side of the face in front of the ears. To the head cap, he fastened an arch bar by means of thumb screws in line with the maxillae, and in the median line or at the sides (depending on the case) of the arch bar, he fastened a fixture to support the fractured portion of the jaw. Kazanjian also believed in having his patients sit outside in reclining chairs in the "fresh air and sunshine" and leaving the wounds uncovered. The facial cases had their own ward and a special recreation lounge room. Kazanjian preferred to work under local anesthesia because patients with extensive facial wounds were especially susceptible to pneumonia following general anesthesia.¹¹¹

Treatment of Fractures

Many types of appliances for treating facial injuries evolved during the war, primarily designed by the resourceful dental surgeons called upon to handle these cases. The continuing "lack of proper equipment for this type of work" handicapped dental officers in France, who were compelled to use "all means at hand" to treat the cases they received. However, the dental officers were able to attain amazing results.¹¹²

Because wounded soldiers with fractured jaws frequently suffered from shock, the immediate treatment was to stabilize them and place the jaw back in its proper position, holding it there temporarily. The early splint had to be capable of a quick release in case of emesis and of rapid replacement when that danger passed. All bone fragments that were "totally detached from their periosteum" had to be removed, and those attached to their periosteum retained. Teeth "in line of fracture" or teeth that were "hopelessly broken or septic" had to be removed as soon as the patient's condition allowed.¹¹³

Tracheotomy was avoided if possible, and free drainage was established at the lower border of the jaw because the wounds were always septic. Clotted blood, dirt, grease, powder burns, and beard hair made these wounds difficult to clean. Ether or gasoline was used to cleanse the skin as soon as the patient was anesthetized. All foreign bodies, detached tissue, broken bridges, and loose crowns and teeth were removed, and drainage was established. The first step was "to save life" and the second to "save tissue." Simple wounds were closed at once, but if the case was more complicated, the tissue was preserved until a more complete operation could be performed. After the osseous structures were taken care of, the injured mucous membrane was sutured in its proper place. Chromocized catgut was used for deeply buried wounds, but for the skin or mucous membrane, silkworm gut, silk, linen, and horsehair were preferred. Compound tincture of benzoin was painted on as a dressing and sterile gauze was placed over the wound. Potassium-permanganate alternated with saline was used as a mouthwash. Argyrol was used to irrigate the wound.¹¹³

According to Dr Kazanjian, the following facial and oral deformities influenced the construction of an artificial restoration:

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1. The destruction of the teeth.
2. The obliteration of the alveolar ridges, with accompanying fibrous adhesions.
3. Distortion of the alveolar arches.
4. Scar tissue which limits the elasticity of the lips and cheeks.
5. The interruption of the bony continuity of the mandible by fibrous tissue.
6. Destruction of a part or whole of the maxilla, resulting in communication between the nasal and oral cavities.^{114(pp69-70)}

The ultimate condition of the oral cavity for the reception of dentures had to be kept in mind when treating gunshot wounds of the face and jaw. Once adhesions and thick facial scars developed, they were hard to overcome. Plastic operations had to be planned to harmonize with the final prosthetic needs of the patient.^{114(p71)}

The hardest step in the construction of prosthetic devices was taking the impression. Scar tissue, tension of the muscular tissue, partial ankylosis of the jaw, and mobility of the remaining bony parts caused "difficulty in keeping the proper 'relations.'"^{114(p84)} Only plaster was available for taking an impression because hydrocolloid had not yet been invented. Vulcanite remained the denture base material of choice.

By November 1918 enough jaw fractures had been treated to indicate that wiring should not only be used as a temporary measure for battle casualties, but also as a permanent device for immobilizing the fractured parts in lieu of waiting for the different types of permanent dental splints to be fabricated at the base hospitals. Wiring immobilized the fracture, yet allowed the desired slight mobility of the joint, and in many cases it prevented a temporary ankylosis. Chewing gum was recommended for trismus, as were wedge-shaped pieces of wood operated by the patient at short intervals during the day. Special attention was to be given to cleaning the tongue by scraping it with a suitable instrument and rubbing it with a pledget of absorbent cotton loaded with pumice and hydrogen peroxide.¹¹⁵

For many years, the intermaxillary wiring technique for treating jaw fractures had been commonly referred to as "Ivy loops," named after Robert H Ivy.^{45,47,104} In 1970, however, Dr Ivy set the record straight when he published the following letter in the *Journal of Plastic and Reconstructive Surgery*:

I have had a regrettable experience, myself, with the award of unfounded credit for originating a technical method of treatment. In a book just off the press, I have noticed a reference to the use of "Ivy" loops in wiring the teeth in treatment of jaw fractures. These should be known as "Oliver loops" that being the surname of the man from whom I adopted them. I gave full credit for originating this method to Colonel Robert T. Oliver, Dental Corps, U.S. Army, in my first published description in 1921, but my name has been erroneously connected with the method for almost fifty years!¹¹⁶

Evaluating the Maxillofacial Service

After the war, Blair evaluated his initial plans and commented on what he would do differently in another war:

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If I had the planning for the care of these injuries in another war, I would not change the general plans projected in the Office of the Surgeon General in but one particular and that would be to have each surgeon and each dental surgeon, selected to be entrusted with this work, carry his emergency equipment with him as his personal baggage with the understanding that his final assignment to this work would depend upon his ability to keep this available. . . .Transportation is the greatest problem in war and everyone participating who has any grasp of the situation is primarily concerned with getting his paraphernalia to its seat of operation. . . . We learned to our bitter sorrow that having the most complete equipment the nation and government cooperating could provide, buried in some base was no help to those who were caring for the wounded. Those concerned with the greater problems regard, first, men, next munitions, then food, all other considerations being secondary. . . . A few pounds of essentials stowed in his personal baggage would have been worth infinitely more to the dentist or the general surgeon than the several hundred pounds allotted that in time would have become available.^{51(p380)}

In their official account of maxillofacial surgery in World War I, Drs Robert Ivy and Joseph Eby assessed the work of the maxillofacial surgeons and dental surgeons of the AEF and its lasting importance:

Very few new principles as regards maxillofacial surgery were developed during the war, but the large number of wounds of this character encountered as compared to their frequency in civil life afforded unprecedented opportunities for demonstrating the advantages and faults of the various operative procedures which had been devised. Based on the experience of surgeons of the allied forces, and from our own observations during our earlier engagements, our maxillofacial surgeons were enabled to draw certain conclusions which proved of the greatest value in treatment of wounds of the face and mouth.^{44(p396)}

Blair himself agreed with this assessment of the wartime work and its contributions to the postwar development of maxillofacial surgery:

Very few new principles in regard to maxillo-facial surgery were developed in this war that do not apply to every type of surgery, but concentration of thought and the clinical opportunities developed special skill. In saying that there have been very few new principles evolved does not imply that there has been no improvement in the execution of the work. Much of the work now done in special hospitals bears about the same relation to the general run of pre-war plastic surgery as would a modern bungalow to a sod hut. The test of use demonstrated the superiority of some methods and the faults of others in a much more authoritative manner than would have been possible in ordinary civilian practice. The men doing this work attained much greater skill and confidence through opportunities that had never before been utilized. Our experience, among other things, emphasized the following: The utility of early continuous treatment; not that we were able to carry it out even in the majority of cases, but the contrast between those cases in which it was done and those in which it was not, was very great.^{51(p382)}

Blair concluded after the war that "our service had some success in its work. In my own mind I am very enthusiastic about its accomplishments."^{50(p326)} The teamwork that Oliver, Logan, Blair, and Ivy stressed between maxillofacial surgeons and dental surgeons for the good of the patient in the AEF helped shape the concept

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of group medicine that Surgeon General Merritte Ireland emphasized during his tenure. In 1921 Ireland directly attributed the close working relationship between the medical and dental services in the Army to the shared successes of the maxillofacial service:

The brilliant record of professional accomplishments made by members of the dental profession in the treatment of maxilla-facial conditions, both at home and abroad during the World War, and the close affiliation brought about through comradeship in the military service, has had a far-reaching effect in developing a mutual understanding and closer relationship between members of the medical and dental professions.^{117(p134)}

Getting Them Ready to Go Home

The armistice of November 11, 1918, did not end the war and did not mean that the American troops could return home immediately. On the contrary, until a peace settlement was reached and treaties signed, the war was not over. Germany could resume hostilities at any moment, although this was highly unlikely. Allied forces had to remain in Europe and in occupation of German territory until the peace was definitely achieved.

This situation provided the opportunity for all dental officers in the AEF to set up offices, unlimber their dental engines, open their chests, and get to work catching up on all of the dental work that had been postponed or that was impossible to do while the fighting was going on. Oliver pointed out in his AEF report on the dental service that following the end of hostilities,

a bone-fide practice of high class dentistry had been seriously and consistently carried on, wherein tooth conservation, repairative and reconstructive dentistry, and the long arduous treatments for tooth reclamation are every day achievements and that masticatory restoration through various methods of prosthesis is being afforded those officers and men who have lost teeth through the enforced dental negligence of battle activities.^{57(p411)}

Compared to the difficult treatment conditions prior to November 11, he noted "the marked contrast" in the quality and quantity of the dental work being done thereafter and "the pleasing resumption of magnificent professional activity, that is commendable in the highest degree."^{57(p411)}

In the armies in the zone of advance (see "Quality Dental Work Resumes," Chapter 15) and the services of supply, dental officers and their assistants now had the time, equipment, and necessary supplies to provide dental care of a much higher order. Tooth conservation was stressed with permanent fillings, restorations, and "the construction of crowns, bridges, and dentures."^{101(p120)} The dental work completed in Base Section No. 2, headquartered in Bordeaux, France, which had an average of 100 dentists on duty monthly, can be taken as representative of the dental service in the base sections in France after the armistice. The consolidated dental reports for January 1919 through May 1919 indicated that dental officers

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TABLE 14-1

PATIENTS, SITTINGS, AND SELECTED DENTAL TREATMENTS AND OPERATIONS AT BASE SECTION NO. 2, SERVICE OF SUPPLY, BORDEAUX, FRANCE, JANUARY 1919–MAY 1919

	January	February	March	April	May	Total
Patients	10,482	9,043	11,021	12,367	7,394	50,307
Sittings	18,146	14,719	19,361	21,731	13,112	87,069
Dental caries	12,420	11,313	17,985	20,905	12,416	75,039
Dento-alveolar abscess	1,958	1,596	1,675	2,151	1,254	8,634
Fillings	12,117	10,405	16,150	18,270	11,125	68,067
Teeth extracted	2,591	2,655	3,320	3,889	2,258	14,713
Teeth treated	3,321	2,770	2,967	3,607	1,725	14,390
Calculus removed	1,336	1,490	2,760	3,331	3,101	12,018
Crown and bridgework	577	501	522	603	370	2,573

Data sources: (1) National Archives and Records Administration. Record Group 120. Form 57, Dental Work at Base Section No. 2, services of supply, American Expeditionary Forces, APO 705; Colonel SD Boak, supervising dental surgeon, January and January supplemental, February, and March 1919. File, Dental Reports, Office of the Surgeon, Base Section No. 2. Box 2788. Entry 2400. (2) National Archives and Records Administration. Record Group 120. Form 57, Dental Work at Base Section No. 2, services of supply, American Expeditionary Forces, APO 705; Colonel Robert F Patterson, supervising dental surgeon, April 1919. File, Dental Reports, Office of the Surgeon, Base Section No. 2. Box 2788. Entry 2400. (3) National Archives and Records Administration. Record Group 120. Form 57, Dental Work at Base Section No. 2, services of supply, American Expeditionary Forces, APO 705; Colonel Robert H Mills, supervising dental surgeon, May 1919. File, Dental Reports, Office of the Surgeon, Base Section No. 2. Box 2788. Entry 2400.

cared for 50,307 patients in 87,069 sittings, and provided a wide variety of dental and oral treatments and operations (Table 14-1).^{118–120}

For the entire AEF, the number of soldiers treated in March 1919 was triple those treated in September 1918 during a high point in active operations.^{101(pp120–121)} In February 1919 a total of 119,792 patients were treated with 183,031 dental operations. When viewed in the context of totality of dental work in the AEF, the statistics for February 1919 clearly indicated that the volume of dental work after November 1918 was very significant (Table 14-2). Work done that month alone represented 8.5% of the total number of patients treated and 9% of the operations in the AEF completed between July 1917 to May 1919.^{101(pp120–121)} In stressing the importance of this work, Oliver's objective and that of the AEF dental service was simple: "to put the teeth of the men in first-class condition, prior to their return to the United States and release from service."^{101(p120)} The emphasis the AEF placed on sound personal dental and oral hygiene and preventive dentistry must have left a lasting impression that millions of American soldiers carried into their peacetime lives.

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TABLE 14-2
DENTAL SERVICE IN THE AMERICAN EXPEDITIONARY FORCES,
JULY 1917–MAY 1919

Patients treated	1,396,957
Sittings	2,636,368
Medicinal treatments	497,948
Operations performed	
Fillings	1,605,424
Extractions	384,427
Total	2,013,580
Crown and bridge construction	60,387
Denture construction and repair	13,140

Data source: Ford JH. *Administration, American Expeditionary Forces*. Vol 2. In Lynch C, Ford JH, Weed FW, eds. *The Medical Department of the United States Army in the World War*. Washington, DC: Government Printing Office; 1927: 121.



*Dental Room, Base Hospital No. 65, Kerhuon, France, January 6, 1919.
Photograph: Courtesy of US Army Military History Institute. SC 48680.*

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Only Part of the Story

Despite numerous obstacles and shortcomings, the AEF's dental service under Colonel Robert Oliver provided an unprecedented level of dental care to the American soldier that not only preserved oral and dental health, but also treated the most grievous war injuries. While much of the work was completed in the more peaceful surroundings of the AEF's base and camp hospitals and dental clinics, and although many patients were treated after November 11, 1918, the dental officers and assistants assigned to the front line divisions were no less responsible for maintaining the soldiers' dental health.

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