

GENERAL CONSIDERATIONS

In the administration of the Dental Service in theaters of operations, it was at first believed that the flexibility needed to meet rapidly changing situations could be attained only by assigning dentists directly to the small organizations which they were expected to serve, together with equipment which could be moved on short notice and set up near the actual combat area. Such assignments were made to small units the size of a battalion or regiment, in each of which 1 or 2 dentists were responsible for the care of from 400 to 3,000 men.

The unit dental officer was normally part of the organization medical detachment, responsible directly to the unit surgeon and through him to the unit commander. He was concerned mainly with the care of the men of his own organization and was involved very little in the problems of the Dental Service as a whole. His relation to the dental surgeon of a higher headquarters was often vague; the latter might offer technical advice, but the unit surgeon actually exercised direct supervision over the dental surgeon's activities. Under such control, the unit dental service had the advantage of flexibility; without waiting for specific orders from higher authority the dental officer and his equipment accompanied the command wherever it might move. Unfortunately, however, there resulted a system of highly dispersed, loosely supervised dental installations with certain very serious weaknesses.

Two of the outstanding defects of the unit dental services, the difficulty of providing uniform dental care in the larger commands and the inefficient utilization of dental personnel, are discussed in connection with the dental service of a division. A third difficulty was the practical impossibility of making an equitable assignment of dental officers to separate small organizations.

In much of the period between World Wars I and II dental officers were provided in an overall ratio of 1 dentist for each 1,000 men. Some officers were required for hospitals and administrative positions, however, and the number available for field units was therefore somewhat less than this figure. In the absence of any formal policy, a ratio of 1 dentist for each 1,200 men in tactical commands seems to have been generally accepted; this ratio was eventually made official in 1943.¹ But since very few units had a strength of exactly 1,200 men, or a multiple of that figure, the application of any fixed ratio was not simple. Even if the doubtful assumption that 1 dental officer could care

¹WD AG Memo W310-9-43, 22 Mar 43, sub: Policies governing tables of organization and tables of equipment. AG: 320.2.

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for 1,200 soldiers was accepted, what was to be done about the organization with 600 men, or the one with 1,800 men? In the final analysis each case still had to be decided on its own merits, and many unsatisfactory compromises were necessary. Some commands which would have been entitled to a dentist under the prescribed policy were allowed none if it was felt that they would be able to get attention from nearby units, while smaller commands were sometimes given a dental officer when they were expected to function independently.

The Dental Division recognized the need for a more equitable distribution of dental personnel. In 1944, with the approval of The Surgeon General and the Air Forces, it recommended that 1 dentist be authorized for each 1,000 troops. At that time the proposed increase was disapproved by Ground Forces and Army Service Forces, and even by the end of the war when it was clear that fundamental changes were needed in the tables of organization of tactical units, no further action on this recommendation had been taken.



Figure 25. Dental Clinic of the 61st Coast Artillery Battalion (AA). Kaldadarnes, Iceland, 1942.



Figure 26. Dental Clinic of the 25th Quartermaster Truck Regiment. Queensland, Australia, 1942.



Figure 27. Dental Clinic of Headquarters Company, 41st Infantry Division, New Guinea, 1943.

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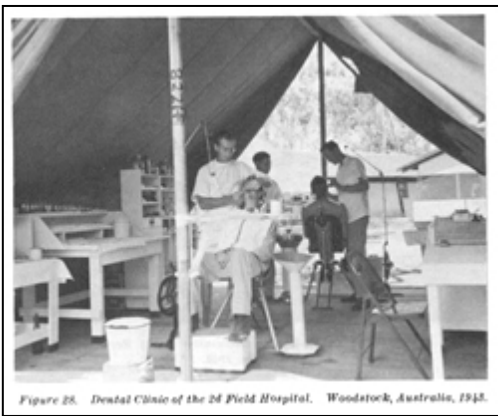


Figure 28. Dental Clinic of the 2d Field Hospital, Woodstock, Australia, 1943.

DENTAL SERVICE OF A DIVISION

In the administration of the dental service the division was an important organization for it was the smallest complete combat team comprised of many arms and services in which coordination of the activities of individual dental officers could be attempted. The division dental service, however, was a very loosely organized activity. It consisted essentially of the separate unit dental services of its component commands, supervised by a division dental surgeon.

At the start of World War II the dental service of a "square" infantry division numbered 30 officers under a division dental surgeon in the grade of colonel. In the "streamlining" of the division to its "triangular" form during the early part of the war this figure was reduced by approximately one-half, otherwise the internal organization of the dental service was changed only in minor details. With something less than 15,000 men the infantry division was authorized 12 dentists. One, in the grade of major, was assigned to the medical section of division headquarters as division dental surgeon. Eleven dentists, captains or lieutenants, were assigned to the larger component tactical units as follows:²

²T/O&E 7,15 Jul 43.

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3 Infantry regiments (3,256 men each)	6
Division artillery (2,219 men)	1
Engineer battalion (664 men)	1
Special troops (943 men)	1
Medical battalion (469 men)	2

One of the first responsibilities of the division dental surgeon was to coordinate the activities of seven or more separate dental services to provide equitable care for the organization as a whole. Under the system officially in effect during most of the war, this task involved formidable difficulties. Many smaller units had no assigned dental officers; moreover, the division was commonly reinforced with a number of auxiliary commands which were also without their own dentists. The total strength of these "orphan" units might reach several thousand men. In theory the personnel of the smaller organizations were expected to receive dental attention from the officers of nearby regiments or battalions, but in practice they were often given treatment under protest, if at all. The dentists of the larger units, who were

individually responsible for a thousand or more men, were naturally reluctant to neglect their own troops to care for adjoining commands, and in this attitude they usually had the full support of their commanders and surgeons. The General Board of the European theater found that "personnel of units whose tables of organization did not authorize dental personnel received as a rule only mediocre dental service. These units depended upon dispensaries, hospitals, clinics, and other units in the area for their dental care, and in most instances the emergency cases only received attention."³ Even among units with assigned dental officers there was no uniformity in the quality of the dental service provided. The dental officer of the engineer battalion, for instance, was able to render adequate treatment for all his 664 men, but the dental officer with the division artillery could meet only a fraction of the needs of his 2,219 soldiers. Even with unlimited authority the solution of this problem would not have been simple, and the practical powers of a division dental surgeon were anything but unlimited.

As previously stated, the dental officer of any individual unit was directly under the surgeon of that unit, who in turn was under the orders of the commanding officer. By tradition and necessity the commander had complete control over all personnel under his supervision, and higher authority was extremely reluctant to disturb internal matters so long as major policies or directives were not violated. The local commander's first responsibility was for his own men, and any proposal to use a dental officer outside the organization, or for the benefit of other troops, was almost certain to meet with prompt and vigorous opposition. As a staff officer, on the other hand, the division dental surgeon generally had no authority to issue orders. He could make recommendations to dental officers and commanders, but neither was obligated to accept his counsel. If his advice on an important matter was rejected his only

³Rpt, General Board, ETO, Study 95, Medical service in the communications zone in the European Theater of Operations. HD: 334 (ETO).

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recourse was to present his problem to the division commander through the division surgeon. If approved, an official order could be sent through channels to the dental officer concerned. Approval of an action opposed by high-ranking subordinate commanders was very difficult to obtain, however, and the division dental surgeon, in the grade of major, who attempted to have a dental officer temporarily released from an infantry regiment commanded by a senior colonel often faced a fight to the finish. At best the procedure of issuing a division order was too ponderous to be of much help in making the frequent minor adjustments necessary to meet a rapidly changing situation. The following account is typical of the problem sometimes encountered by dental staff officers:

In 1943 the dental surgeon of the Middle East theater found that the dental officer of a unit which had been cut to about 400 men was being given full-time duty in administrative work, principally as court-investigating officer. On the same post three dental officers of other organizations were vainly trying to meet the needs of several thousand men, including the personnel of the unit in question. The unit commander flatly refused to release his dental officer for duty in the post clinic, or even to place him on professional work with his own personnel. The next higher commander admitted the need for corrective action but refused to interfere in what he considered the internal administration of the subordinate unit. The theater commander, in turn, did not consider the utilization of a dental officer a sufficiently important matter to warrant reversing the decision of another senior commander. In this particular case it was eventually possible to have the dentist transferred to another unit on the grounds that the original organization had been reduced in strength to a point where assignment of a dental officer was no longer necessary, but even this step was attained with difficulty and at the expense of the ill-will of the commander concerned.⁴

Surgeons and line commanders, like dentists, were only human; in some cases they did not exercise, perfect judgment in dealing with dental problems. Nevertheless, they cannot be blamed for the main defects of the division dental service. Both were only exercising the established rights of any commander, and both felt that they were showing only praiseworthy concern for the welfare of their men when they refused to release a dental officer for temporary duty where his services were more urgently needed. Only a complete revision of the division dental organization could avoid the difficulties inherent in an attempt to provide uniform dental care with a number of small, independent, unit dental services.

Another problem of the division dental surgeon was keeping all unit dental officers performing professional duties whenever possible. In a reinforced division each dentist might have to care, for as many as 1,500 men, and even the minimum needs of such a population could be met only if each

⁴Personal experience of the author who was dental surgeon of the Middle East theater at the time these events took place.

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dental officer devoted all his time to the duties for which he was trained. Yet on the dentists of units in combat could not operate clinics under fire and for weeks at a time could render only emergency treatment or act as assistant battalion surgeons.

As the war progressed it became increasingly evident that a more efficient use of tactical dental officers was imperative. A unit which entered combat in good condition could go for some time with emergency dental care only, plus the

sporadic attention that was available between periods of fighting, but lack of definitive treatment eventually resulted in reduction of combat efficiency due to excessive evacuations for dental causes.⁵

Almost every World War II division ultimately attempted some modification of its dental service in an effort to improve the efficiency of dental officers assigned to combat units. The War Department apparently did not wish to prescribe any rigid reorganization however, until the more promising suggestions had been tested under field conditions, and no official change was published until near the end of hostilities. Most improvements were therefore made on the personal initiative of progressive dental officers, with the help and advice of farsighted surgeons and line commanders. The final result, which differed in almost every organization, depended upon the individual ideas of the dental surgeon and the support received from his superiors. In a few divisions where dental surgeons were given complete control of all dental personnel and facilities, a near-ideal type of service was possible. In one such division the dental service was organized as follows:⁶

The division dental surgeon kept the dental survey records showing the condition of the command and supervised the operation of all dental facilities. One dentist of the medical battalion acted as division prosthodontist and operated the dental laboratory. The remaining 10 dental officers were assigned to staff 2 clinics. Each of these clinics had its own electrical generator and tentage and could be employed alone if necessary. Both clinics might be set up near the clearing station, or either or both might be moved on short notice to some location where they were more urgently needed. On the rare occasions when all combat units were committed to action the clinics worked for service personnel and for replacements. Treatment for the latter was particularly important since many hundreds might arrive in a single day and many needed care before they were assigned to combat organizations. The advantages of this type of division dental service became most apparent, however, when an infantry regiment or other combat unit was withdrawn from action. When the command arrived at its designated rest area it found a clinic staffed by at least five dental officers. It was equipped with electric engines and lights and so organized as to use the special skills of all its personnel. With such a

⁵History of the Dental Division, Hq, ETO, 1 Sep through 31 Dec 44. HD.

⁶The dental service described is that of the 8th Div, 9th Army, ETO. Info furnished by Brig Gen James M. Epperly, former dental surgeon, 9th Army.

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concentration of dental facilities it was possible to complete a great amount of work in a short time and no dental officer wasted his efforts in nonprofessional duties or tried to operate under hopelessly adverse conditions. If necessary, single dentists could, of course, be sent to individual units, but the improvement in dental care for the whole command which resulted from the procedure just outlined greatly lessened the need for emergency treatment even in the small organizations. Though the dental service remained under the ultimate control of a medical officer (the division surgeon) this experienced senior medical officer who was more interested in the dental welfare of the whole command than was the average regimental surgeon, saw to it that service was impartially rendered to all elements.

In divisions where similar plans were effected the reaction of both dental officers and line commanders was uniformly favorable. (One armored division disapproved the centralized dental service because it was believed that individual officers were given an incentive for better work when they were responsible for the same troops at all times, but this division had not actually tested the plan.) It was found that with centralization even the larger organizations received much better care than had been possible when their own dentists had tried unaided to meet the needs of their commands in the short intervals between actions, while the smaller units were able to get treatment on the same basis as the larger. An effective division prosthetic service was provided and dental officers worked under conditions which promoted maximum efficiency. Line commanders were relieved of the unfamiliar responsibility for the Dental Service of their commands and their traditional rights were not compromised since the dentist was now assigned directly to a medical unit.

The increased output attained by centralizing the division dental service and placing it under immediate dental control was surprising even to the sponsors of such plans. One division in Europe reported that during the first week of operation 5 dental officers in a central clinic produced 17 times as much work as they had when working with their individual units.⁷ During periods of combat the output of 10 dental officers of this division had previously fallen to 40 percent of the theater average (combat and noncombat) and to only 20 percent of their own noncombat average. With inauguration of the central clinic in a rear area the same officers completed more than four times the theater average of work even during combat, and during the exceptionally unfavorable circumstances existing in December 1944 their output still exceeded the theater average by 70 percent.

By the end of 1944 the Dental Division felt that sufficient experience had accumulated to justify an effort to have a revision of the division dental service authorized in tables of organization. Three senior officers who had been dental surgeons of armies or major theaters were requested to submit a joint

⁷Annual Dental Rpt, 8th Div, ETO, 1944. HD.

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Figure 29. Dental Survey in European Theater, 1944.

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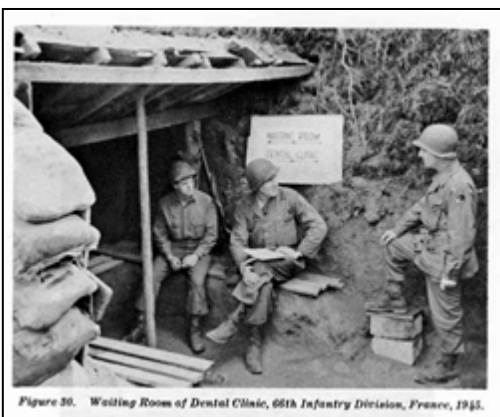


Figure 30. Waiting Room of Dental Clinic, 66th Infantry Division, France, 1945.



Figure 31. Dental Clinic, 9th Evacuation Hospital, France, 1944.

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study of the dental service in the field. On 8 February 1945 they reported to the surgeon of the Army Ground Forces as follows:⁸

Under the present method of assignment of dental officers to various units within the division the control and disposition of the division dental service by the division dental surgeon is greatly hampered. He may desire to utilize certain dental officers in other than their assigned units, and if the regimental or unit surgeon objects the dental surgeon is often overruled since the regimental or unit commander accepts the advice of his surgeon. . . . The unit surgeon's view is often selfish, being concerned only with his organization. For maximum efficiency the dental service of a division must be flexible, and if flexibility is obtained the dental officers can be busily engaged in constructive operational procedures under practically all conditions. . . . The dental needs of a division require the full and most efficient utilization of

its dental personnel in dental capacities at all times. To secure this the following outline of a divisional dental service is offered:

a. The division dental service to consist of a division *dental detachment directly under the division dental surgeon*, who in turn functions directly under the division surgeon.

b. Detachment to consist of:

Division dental surgeon	1
Prosthodontist	1
General operators	10
Total officers	12
Clerk (for divisional dental surgeon)	1
Technicians (O67)	2
Technicians (855)	11
Total enlisted men	14

With this centralization of control the division dental surgeon can utilize personnel to maximum advantage by attaching officers or establishing clinics with units or in locations where the greatest amount of work can be accomplished. Normally five officers should be attached to forward units to provide emergency treatment and at the same time to accomplish as much definitive work as possible. These five would normally be distributed as follows: Each infantry regiment (1), division artillery (1), and engineer battalion (1). The remaining six officers (exclusive of the division dental surgeon) to be held in service areas where dental work can constantly be performed upon rear echelon troops and combat troops in reserve and in rest areas. These six may be utilized as one large clinic if the situation warrants, divided into two groups of three each, or three groups of two each. The division laboratory would normally be in conjunction with one of these rearward clinics. . . .

The important and fundamental features to be stressed for a division dental service are: (1) Centralized control; (2) Maximum motorization possible.

Based on these recommendations, new tables of organization and equipment for the headquarters and headquarters company, medical battalion, were published on 1 June 1945.⁹ This reorganization concentrated the entire division dental service in a "division dental section" in the medical battalion, consisting of a division dental surgeon in the grade of major, a division prosthodontist, and 10 general operators in the grades of lieutenant or captain.

⁸Memo, Maj Gen R. H. Mills for Gen F. A. Blesse, 8 Feb 45. SG: 444.4.

⁹T/O&E 8-16, 1 Jun 45.

Thirteen enlisted assistants were authorized as follows: 1 sergeant (855) for supply and administration, 10 technicians grade 5 (855) as dental assistants, 1 technician grade 3 (O67) in charge of the laboratory, and 1 technician grade 4 (O67) as laboratory assistant and truck driver. The division dental section was also authorized a dental laboratory truck; one 2 1/2-ton cargo truck with a 1-ton, 2-wheel trailer; six 1/2-ton trucks ("Jeeps") with 1/2-ton, 2-wheel trailers; a 3-KVA generator; 11 Chests No. 60; a field kit for each officer; and enlisted man's kits for 11 of the dental technicians. It was provided that "normally 1 dental officer (general operator), and 1 technician, dental, (855), will be attached to the following units when in actual combat: each infantry regiment; engineer combat battalion."

World War II ended before the reorganization prescribed in T/O&E 8-16 could be put into effect, but previous experience with similar unofficial plans in individual divisions justified the belief that it would result in more adequate dental service for

all personnel of units larger than regiments.

Even with the new centralized dental service there would undoubtedly be occasions when dental officers could not function in a professional capacity. In an invasion, for instance, dentists could be of most service as assistant surgeons during the period when the landing was being consolidated. Under such circumstances there was nothing to prevent the division surgeon, who had the dental detachment at his disposal, from using all or part of the dental personnel for nondental duties. But as soon as conditions permitted, the dental detachment could be reassembled to resume its primary function of preserving the dental health of the command.

DENTAL SERVICE OF A FIELD ARMY

Since the composition of a field army was determined by its mission rather than by fixed tables of organization, the number of dental officers assigned might vary within wide limits—from a minimum of about 100 to a maximum of many hundreds. (The Ninth Army had 650 officers at one time.)¹⁰ Something less than half of the dentists of an army were assigned to the component divisions operating under the general supervision of division dental surgeons. The larger proportion, however, were assigned to hospitals and army units other than divisions, and the army dental surgeon was directly responsible for their activities, as well as for the general guidance of the division dental services.

Medical units assigned to an army were concerned primarily with the evacuation and care of casualties, and except for the provision of extremely limited prosthetic facilities their dentists could not be counted upon to render routine treatment for army personnel. Army medical units varied as widely

¹⁰Info furnished by Brig Gen James M. Epperly, former dental surgeon, 9th Army.

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as did other elements, but a typical allotment (units with dental officers only) for an army of nine divisions would have been:¹¹

Units	Numbers	Dental officers
Medical clearing companies	9	18
400-bed evacuation hospital	9	18
750-bed evacuation hospital	1	3
Auxiliary surgical group (Before April 1944)	1	7
Gas treatment battalion	1	3
Convalescent hospital	1	4
Field hospital	5	15
Medical depot company (After March 1944)	1	2
Total		70

In addition to the dentists assigned to army medical units, a large number of dental officers were on duty with the many service and combat elements allotted the command for the reinforcement of the basic infantry and armored divisions. The number of dentists so available was not constant, but generally exceeded the total of all dental officers with the combat divisions.

The problems of an army dental surgeon were essentially those of a division dental surgeon, on a larger scale. However, the difficulties of providing adequate dental care for the organization as a whole were increased in an army, partly because a larger number of troops were involved, but mainly because a much larger proportion of the army troops had no regularly assigned dentists. The principle of allotting dental officers directly to individual units had been based on the assumption that such distribution would provide for the majority of the troops in an area and that the relatively unimportant remainder could be taken care of by means of minor adjustments in the overall dental service. This assumption was partly justified in a division where the assignment of 7 dental officers to the 3 infantry regiments and

the division artillery provided at least minimum dental care for four-fifths of the total strength of the command. But in an army the situation was reversed, and dentists assigned to individual army units provided dental care for only a very small proportion of the total strength. The nature and magnitude of this problem was more clearly revealed in a study carried out by the dental surgeon of the Ninth Army in Europe. His analysis of the dental service of a "type army" (3 corps of 2 infantry divisions and 1 armored division each) disclosed the following situation:¹²

Number of nondivisional troops with a type army	157,493
Number of dental officers assigned to nondivisional troops (including medical units)	205
Average number of troops per dental officer	768
Number of units <i>with</i> assigned dental officers	141 (23.3%)
Number of units <i>without</i> dental officers	463 (76.7%)

¹¹T/O&E's for the organizations listed varied somewhat from time to time.

¹²See footnote 10, p. 298.

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Number of troops <i>with</i> assigned dental officers	48,225 (30.6%)
Number of troops <i>without</i> dental officers	109,268 (69.4%)

It will be noted from this summary that the problem of an army dental surgeon resulted principally from inequities of distribution rather than from shortages of facilities. The overall ratio of 1 dentist for each 768 men was higher than in combat divisions, yet only 48,225 troops were cared for by their own assigned dentists. The remaining 109,268 had to receive dental attention from officers assigned to other units. In addition to the usual difficulties of persuading dentists to provide adequate treatment for the personnel of other units, the army dental surgeon was thus faced with the necessity of making, with every important change in the general tactical situation, new arrangements for the treatment of 100,000 or more men in 463 units.

The dental surgeon, Ninth Army, also emphasized another fact often overlooked; namely that the dental service of nondivision troops of an army far overshadowed that of the divisions themselves. There was a strong tendency to regard the divisions as the "core," of an army and to depreciate the importance of the "auxiliary" army troops, but the type army considered in the aforementioned summary required only 108 dental officers for the treatment of division troops while 205 were assigned to army units. Improvements in the Dental Services of divisions, important as they were, failed therefore to solve many of the overall problems of army dental services.

The striking advantages which resulted from concentrating all dental facilities of a division into a central detachment under the division dental surgeon suggested to some senior dental officers the possibility of applying the same principles to the problems of army dental services. Among the more interesting proposals along these lines was a plan submitted by the dental surgeon of the Mediterranean Theater of Operations.¹³ This plan, which was designed to insure greater efficiency and a more equal distribution of dental service to all military personnel in theaters of operations, presented the following changes for eliminating the weaknesses of the system then in effect:

1. Removal of all dental officers from present individual assignments, except for those with hospitals, general dispensaries, and administrative headquarters.
2. Organization of dental detachments of 15 dental officers, 1 Medical Administrative Corps officer, and 24 enlisted assistants and technicians. Each detachment to have its own essential transportation and tentage and a mobile dental laboratory. The dental detachment to be organized and equipped so that it could function as one large clinic or as a number of smaller installations.
3. Each major force to be authorized dental detachments in the ratio of 1 detachment for each 15,000 men. Each detachment would be assigned to an appropriate area and the dental surgeon in charge would be responsible for utilizing his resources in the most efficient manner for the benefit of all troops in the area.

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During the war no such sweeping reorganization of an army dental service was attempted, however, and the coordinating activities of army dental surgeons were generally limited to relatively minor shifts of local facilities to meet changing situations.

Another persistent problem of the army dental surgeon, especially during the first years of the war, was the provision of an adequate prosthetic service. This was partly solved by the addition to combat divisions of prosthetic facilities, but it still did not provide the army dental surgeon with adequate facilities to care for special army troops. Of the army medical units, the 400-bed evacuation hospitals and the field hospitals had no laboratories; the larger evacuation hospitals were often not supplied in armies; and the convalescent hospitals, limited in number, were usually fully occupied with treating their own patients. The army dental surgeon might thus have only the three prosthetic teams of an auxiliary surgical group and a small number of prosthetic field chests from army medical battalions and clearing companies to render laboratory service for nondivision troops totaling more than 150,000 men. Though this situation was greatly improved by the arrival in quantity of the prosthetic trucks, it was still necessary to operate improvised (and unauthorized) laboratories in subordinate units (e. g. corps) and in such strategic locations as army replacement depots.

There is evidence in fact that even if the authorized ratio of 1 mobile prosthetic team for each 30,000 men had been attained in World War II, the full laboratory needs of armies and other major units would not have been met. From figures on the monthly requirements for replacements in the Fifth Army and from production records of the prosthetic teams, Colonel Lynn H. Tingay, former dental surgeon of the Mediterranean Theater of Operations, calculated that a single team with a division would meet about 75 percent of the prosthetic needs of the (approximately) 15,000 men of that unit.¹⁴ This left a residue of 25 percent of all prosthetic service for divisions to be met by other means. On a similar basis, a single truck assigned to 30,000 army troops would be able to complete only about 35 percent of all needed dental prostheses, leaving 65 percent to be constructed by other installations. Colonel Tingay estimated that a "type" army (nine divisions) would need laboratory facilities for handling about 1,000 cases a month in excess of the combined capacity of the authorized prosthetic teams and army hospital laboratories. To meet this situation he recommended that "BI" teams ("dental prosthetic detachment, fixed," with 2 officers and 6 technicians) of the medical service organization be authorized for armies in the ratio of 1 team for each 100,000 men. Under favorable circumstances two or more teams could be grouped to afford the advantages of "production line" operation. Though it cannot be determined without further experimentation whether this or a mobile type of installation would be more

¹⁴Personal Ltr, Col Lynn H. Tingay to author, 13 Feb 47.

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effective in meeting the prosthetic requirements of an army, most dental surgeons were agreed that some reinforcement was urgently needed.¹⁵

DENTAL SERVICE IN THE COMMUNICATIONS ZONE

The organization of a communication zone varied so widely according to the size and geography of the theater, and the nature of the principal mission to be accomplished, that its dental service could have no uniform structure. In particular, the dental surgeon might be directly responsible for all dental activities in the area, or he might act through two or more dental surgeons of subordinate "base commands." In general, however, communications zone dental facilities could be grouped under the following broad classifications:

1. Dental officers assigned directly to tactical commands. (In a communication zone, as in a combat zone, it was difficult to provide a uniform dental service with hundreds of individual officers concerned only with their own units. A detailed discussion of this problem has already been presented in connection with the dental services of the divisions and armies.)
2. Dental clinics and detachments established in connection with standard table of organization medical units.
3. Special dental facilities set up to meet unusual situations. In the communications zone auxiliary dental care was provided by a number of medical organizations. In addition to those discussed in connection with an army dental service, the communications zone might have available any or all of the following, in numbers depending upon the strength of the theater:¹⁶

Units

Dental personnel

Officer

Enlisted

1,000-2,000-bed general hospitals	5-10	9-13
25-900-bed station hospitals	1-4	1-7
Convalescent centers (3,000-bed)	5	9
Convalescent camps (1,000-bed)	3	6
Medical supply depots	1	-----
Medical dispensaries, aviation	1	1
Dental prosthetic detachments, mobile (1 for each 30,000 men)	1	3
Dental prosthetic detachments, fixed	2	6
Dental operating detachments, mobile (1 for each 25,000 men)	1	1
General dispensaries (serving 2,000-10,000 troops)	1-3	2-4
Dispensaries (serving 1,500-3,000 troops)	1	1
Medical detachments (assigned separate battalions)	1	1
Hospital centers (headquarters only)	1	-----
Maxillofacial detachments	1	1

The hospitals provided all types of dental care for their own patients; also treated the more serious oral surgical conditions of troops in nearby units. They had small laboratories and during the first part of the war it was

¹⁵(1)Personal interviews *by* author with senior dental surgeons. (2) See footnote 3, p. 291.

¹⁶The last eight installations listed were part of the Medical Service Organization, T/O&E 8-500, 18 Jan 45.

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expected that these would provide an important part of the prosthetic service in theaters of operations. It will be pointed out, however, in the discussion of the overseas prosthetic service, that the demand for dental appliances soon became too large to be met by the hospital laboratories. Planned primarily to care for the sick and wounded, the hospitals did not have enough reserve capacity to supply dental service for large bodies of troops.

Of the smaller detachments, the "medical dispensary, aviation," and the "medical detachment" were assigned to separate bodies of troops having no regular dental officers, providing a service similar to that furnished by unit dentists. Before hostilities ended dental prosthetic detachments and dental operating detachments were available only in very small quantities and were generally used where more critically needed-in the combat zone. General dispensaries were employed only in connection with the more important headquarters, but with only three assigned dental officers the amount of dental care provided was woefully inadequate.¹⁷ The dental officer with a hospital center was engaged in purely administrative duties. The functioning of the maxillofacial detachment will be discussed in connection with the evacuation of dental casualties. These smaller dental units met critical needs but they were specialized organizations designed to meet specific requirements for mobility or to provide care for definite bodies of troops who otherwise would be neglected. Even had they been available in the numbers authorized, the bulk of the communications zone dental service would still have been rendered by unit dentists and hospital clinics.

Standard dental facilities sometimes failed completely to meet the needs of large concentrations of troops in the communications zone. The fixed prosthetic team of 2 officers and 6 technicians, for instance, was not designed to supply large scale laboratory service for hundreds of thousands of men, and a 100-man laboratory had to be established in England. Similarly, the largest general dispensary had only 3 dental officers, yet 35 dentists were required just to care for military personnel in and around Paris.¹⁸ Large clinics had to be supplied such installations as the replacement depot near Naples where 5,200 men arrived in one day.¹⁹ Consequently the communications zone dental surgeon, who was also the theater dental surgeon in most instances, was required to improvise a considerable number of large clinics and laboratories not contemplated in tables of organization.

The theater dental surgeon had no reserve pool of dental personnel with which to establish these, essential but nonstandard installations. Depending upon the urgency of the situation he had possible recourse to two alternatives:

1. If the need for the special facility could be adequately foreseen, the dental surgeon could submit for it a tentative table of organization. If

¹⁷See footnote 3, p. 291.

¹⁸*ibid.*

¹⁹Rpt, Peninsular Base Sec, supp. to the Dental History, MTO. HD.

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approved by the theater commander and the War Department, this table of organization became the authority

for requisitioning necessary personnel from the Zone of Interior. The principal defect of this method was the time element for even under the most favorable circumstances several months were required to get the approval of all concerned and to complete the shipment of personnel to the theater. On the other hand, staff officers were slow to be convinced that a unit not contemplated in existing tables was actually necessary. The whole process of having a special table of organization authorized was so cumbersome that only one dental installation, a central dental laboratory, was so procured in the European theater during hostilities.

2. The theater dental surgeon might, with the consent of the theater commander, establish the needed installation with personnel already in the area. This procedure did not increase the total number of officers allotted to the theater, however, and it could be accomplished only by "robbing Peter to pay Paul"; men had to be "borrowed" from other organizations from which they could ill be spared.²⁰ Dental surgeons used devious methods to obtain the officers to staff such facilities with a minimum of disruption of the dental service. Most of the dentists drafted for such duty could be used for only a few weeks and the turnover of personnel was high. Constant supervision was needed to insure a steady flow of replacements and to provide qualified officers for the oral surgical and prosthetic services. Very little organization for efficiency was possible when key men might be lost at any time. Personnel from the smaller dental detachments were sometimes juggled to provide a reasonable approximation of the desired unit. In Europe, for instance, 6 fixed prosthetic detachments were used to establish a 36-man laboratory in Frankfurt.²¹ Since only 2 of the 12 officers obtained were needed in the laboratory the other 10 were used to reinforce the badly overworked dental dispensary in the same city. Such subterfuges were countenanced because the results justified the means and no one was willing to inquire too closely into how they were obtained. The formation of these nonstandard, improvised units was necessary in the absence of any better plan, but the difficulties encountered emphasized the need for establishing approved tables of organization for all important installations which may be required in an overseas campaign.

Even more than an army dental surgeon, the theater dental surgeon was heavily burdened with the never-ending task of maneuvering minor, widely scattered, dental facilities to provide care for units with no dental officers and to make available the personnel needed to staff the large nonstandard clinics and laboratories. World War II experience indicated that the problems of a theater dental surgeon could be materially reduced, and the dental service improved, by two steps:

Make available to the theater dental surgeon a small pool of reserve per

²⁰See footnote 3, p. 291.

²¹Personal knowledge of author who was stationed in Frankfurt at the time.

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sonnel to meet emergencies and add flexibility to the dental service. The dental surgeon of the European theater stated that "the one recommendation which this division cannot stress too strongly is that some provision be made for a pool of dental officers in theaters of operations."²²

Remove dental officers from individual tactical units and assign them to dental detachments of 15 or more dentists, similar to those already discussed in connection with the dental service of an army. Each dental detachment, under an experienced officer, would, regardless of parent organization, be responsible for the care of all troops in its area. Detachments would be allotted throughout the communications zone on the basis of 1 unit for approximately 15,000 troops and according to the disposition of personnel each detachment would establish a dental laboratory and 1 to 4 or 5 clinics. The theater dental surgeon would make an equitable distribution of the detachments to meet overall needs but minor local adjustments would be made on the spot by the detachment commander who would also supervise the detailed functioning of his men. Such a reorganized dental service would have the following advantages:²³

1. The provision of uniform treatment for large and small units would be simplified.
2. Dental officers would function under the immediate observation of an experienced officer rather than under the loose supervision of a line commander or a surgeon unfamiliar with the requirements for a good dental service. Line commanders would be relieved of the responsibility for the detailed operation of a highly technical activity having no relation to the primary mission of the organization.
3. To handle difficult conditions specially qualified men could be provided.
4. Dental officers would be relieved of individual responsibility for supplies, records, and other miscellaneous overhead, allowing them to devote more time to their proper duties.
5. Local adjustments of dental service could be made at once, on the spot, without the necessity for prolonged consultations with numerous individual commanders and dental officers.

It would also appear that the dental surgeon of a major theater would be able to discharge more effectively his responsibility for the quality of the dental treatment if given the assistance of one or more dental consultants. The

²²History of the Dental Division, Hq, ETOUSA, from inception to 1 Sep 44. HD.

²³This plan for the organization of the Dental Service has been proposed by several senior dental officers who occupied positions of responsibility during the war, particularly by Maj Gen Thomas L. Smith, Chief of the Dental Service, and by Brig Gen James M. Epperly, former dental surgeon, 9th Army, Europe. General Smith, however, has also suggested certain disadvantages of such a policy. In the invasion of France, purely dental units were given such a low priority for shipment that some would not have arrived in less than 3 months. It was found that dental installations could be moved to France in time to accomplish their mission only if attached to a combat command. One laboratory received a warning order for its move several weeks after it had already set up on the continent subsequent to having been informally attached to a line unit for the channel crossing. Application of the "cellular" type of dental organization would also necessitate some revision of plans for dental surveys, but satisfactory alternate schemes have already been worked out in some divisions and armies.

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European theater had the services of an oral surgery consultant during the war but no full time consultant was on duty in any other theater headquarters. The administrative duties of a theater dental surgeon were sufficient to occupy most of his time, and in any event it would seem to be expecting too much of any one man to ask him to pass on the quality of the care given by specialists in three or more fields.

DENTAL SERVICE IN AN INVASION

Dental preparations for an invasion began long before the event with an intensified effort to put all men in the best possible condition. The dental officers of individual units brought surveys up to date, eliminated conditions which might cause men to become noneffective, and speeded up the tempo of routine treatment. At the same time dental surgeons of major commands reinforced unit dental officers with all available prosthetic and operative resources, and a special effort was made to complete essential replacements.

With the assembly of the invasion force in the vicinity of the ports of embarkation it was no longer possible to continue dental service on a large scale and emphasis shifted to the care of last minute emergencies. Since by this time the equipment of unit dentists had been packed, the bulk of dental care in the marshalling areas had to be furnished by installations not involved in the movement.

In the actual invasion and during the initial assault phase, the activities of dental officers differed with the type of action and resistance encountered but in general they served as assistant battalion surgeons or performed other nondental duties. In subsequent periods they usually continued in such capacity until dental equipment could be assembled for the resumption of normal dental activities. In the meantime, though the incidence of emergency dental cases was low, dental kits were utilized to care for those which did occur.

Lag in commencement of dental operations, as such, varied from several days to several weeks, and in some combat units fully 50 percent of the dental officers continued to be employed in a medical status for a number of months. In one such combat unit a dental officer remarked "I gave more plasma than I inserted fillings."²⁴

The prolonged use of dental officers as auxiliary medical officers was widely condemned by most senior dental officers, but it cannot be denied that due to the exigencies of the first phases of an invasion, dental officers must be prepared to assume other duties until the situation has become partially stabilized. However, experience has shown that unless dental officers resume their normal functions at the earliest possible date any advantages gained by their emergency assistance will be offset by increased evacuations for dental reasons.²⁵

²⁴Rpt, 7th Army Sec, supp. to the Dental History, MTO. HD.

²⁵See footnote 5, p. 293.

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DENTAL SERVICE FOR REDEPLOYING TROOPS

With the end of hostilities in Europe the Dental Service was suddenly charged with the responsibility for surveying and completing essential dental treatment for thousands of men being redeployed to other combat areas. Due to the following circumstances this task involved unusual difficulties:

1. Personnel being processed in redeployment centers were available for a very short time only, and often arrived in waves which taxed the facilities provided for normal operation.
2. Redeployment centers were often established in areas where existing dental facilities were limited or nonexistent, so that clinics had to be built, equipment obtained, and personnel assembled before treatment could be started.

3. The general reshuffling of officers and men incidental to making up units for redeployment to the Far East affected dental personnel as well as combat troops and the confusion of the period multiplied the difficulty of obtaining sufficient dentists and technicians for operation of the necessary clinics and laboratories. No tables of organization were drawn up for these interim installations and personnel had to be borrowed from hospitals or other organizations, usually on a temporary duty status.

So that he could plan the clinics and supervise their construction or conversion the dental surgeon assigned to a redeployment center usually arrived about a week or two before operations were to begin. He then submitted requisitions for equipment and personally followed their progress through intermediate offices to insure rapid action. Dental personnel, supplies, and patients usually came in at about the same time. About half of the staff were obtained from the redeployment center complement and the remainder borrowed from organizations currently being processed. Basic equipment was normally the M. D. Chest No. 60 plus such civilian items as could be procured locally. Lights, cuspidors, and other improvised supplies were constructed and installed by engineer or ordnance detachments. Since prosthetic treatment made up a high proportion of all dental care rendered in redeployment centers a laboratory was essential, and in the absence of other trained personnel it was often staffed in part by qualified prisoners of war.

At the Florence Redeployment Center,²⁶ which had a maximum capacity of 25,000 men, provision for a 21-chair clinic was made. A single oral surgeon was able to handle all extractions but three officers were placed on prosthetic duty. One chair was devoted to examinations and one was used by the x-ray service the remainder for routine operative procedures. The permanent staff numbered 16 officers and 36 enlisted men; the rest of the personnel required to operate the installations were obtained from transient units.

²⁶History, Dental Clinic, Florence Redeployment Center, 10 Aug 45, inclosure to Supp. to Dental History, MTO. HD.

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Dental officers on loan from other organizations had to be replaced at short intervals and dentists of the station complement had to be released for redeployment or return to the United States. Thus the turnover of personnel was constant and heavy. One of the principal duties of the dental surgeon was to estimate future requirements for his staff and arrange for necessary replacements.

When a unit arrived in a redeployment center the dental surgeon immediately contacted the organization commander and arranged for a dental survey if one was necessary. If the unit had an assigned dental officer he was directed to report to the central clinic for duty as long as he was in the camp. Men in Class I or I-D were called for early treatment, followed by as many less urgent cases as could be handled in the time available. All urgent treatment was completed and, except in periods of peak operation, a large proportion of minor defects were corrected as well, so that a high ratio of the men departing from a redeployment center were in Class IV. Since from 20,000 to 30,000 men might be processed in less than 2 months such a result could be achieved only with the most efficient organization and supervision.

The dental condition of men going through the redeployment centers varied widely according to whether or not they had been in extended combat and whether or not their units had had assigned dentists. In general, however, dental defects were not excessive. The following comparison of the classification of men redeployed through a center in Italy and men inducted at Camp Robinson (Arkansas) in 1942 shows that the dental condition of most men had been greatly improved during their Army service, even while in combat:^{27 28}

Class	Redeployment Center Florence Percentage	Training Center Camp Robinson Percentage
I	0.9	-----
I-D	2.7	26.5
II	19.5	29.3
III and IV	76.9	44.2

THE EVACUATION OF MAXILLOFACIAL CASUALTIES

Since maxillofacial casualties went immediately into the general chain of evacuation the dental service had no special responsibility for their management beyond cooperating in their treatment at medical installations en route. Methods of handling wounded men varied with geography, combat conditions, and transportation facilities, but a typical system might be described as follows:

1. Within a few minutes after receiving his wound the injured man was usually picked up by a "company aid man" of his own organization. This

²⁷See footnote 26, p. 307.

²⁸Health of the Army, vol. I, Report 1, 31 Jul 46, p. 8.

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Medical Department soldier was trained in first aid and could stop bleeding or take other steps immediately necessary to save life but his principal function was to get the casualty into the hands of a supporting medical unit which would remove him from the combat area. The aid man stopped hemorrhage, applied a bandage, and directed the wounded man to the battalion aid station several hundred yards to the rear. If the patient could not walk he was carried by litter bearers sent forward from the same installation.

2. The battalion aid station was set up with field chests in the first available cover behind the "front line." Here the casualty was seen by a medical officer and possibly a dental officer as well, though the latter was more often located at the regimental aid station. Since the battalion aid station had meager facilities and poor protection from enemy fire the wounded man was held there only long enough to prepare him for further evacuation and to arrange his transportation to the rear. His bandages might be adjusted, he might be given plasma or a sedative if required, and an open airway was assured, but as soon as possible he was turned over to litter bearers sent forward from a collecting station which had been established by medical troops of the division medical battalion. The regimental aid station was usually bypassed at this point.

3. Division collecting stations were normally established within litter-carry distance of the battalion aid stations they served and, if possible, on a motor road passable to the rear. Two medical officers were available and with slightly more elaborate equipment they could attempt emergency procedures which were not practical at the battalion aid stations. However, the collecting station was still within easy range of hostile artillery and mortar fire and its primary mission was the assembly and evacuation of patients rather than treatment. In the absence of a dental officer at the collecting station the maxillofacial patient usually received only such general care as would minimize the danger of further transportation by ambulance to the clearing station.

4. Clearing stations were division medical installations which were normally established several miles behind the lines for the further assembly and treatment of patients from the collecting stations. Four medical officers and at least one dentist were in attendance and equipment included a small operating room and ward tents for the temporary care of patients who could not immediately be removed to a hospital. A clearing station had to be ready to move on short notice, however, and only the most urgent operational procedures were undertaken. A maxillofacial injury normally received little care at this point beyond the control of bleeding, treatment of shock, and possibly the temporary immobilization of fractured jaws with some type of bandage. As soon as possible the patient was removed by ambulance to an evacuation hospital.

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5. Evacuation hospitals of 400 or 750 beds were army installations established beyond the range of ordinary artillery fire and within reach of reliable transportation to a major hospital in the communications zone. Though they were mobile and often operated under tentage they were true hospitals and had the equipment and personnel to institute general definitive treatment for casualties who had received emergency care in the installations already discussed. They possessed medical, surgical, and x-ray facilities, and the dental officers sometimes, though not always, had prosthetic chests in addition to the authorized dental operating chests. When casualties were heavy a special maxillofacial team might be attached. If such a team was available, the maxillofacial injury received conservative debridement, foreign bodies and unattached bone fragments were removed and fractured jaws immobilized with more permanent fixation than was afforded by bandages. Drainage was provided and prophylactic doses of penicillin or sulfa drugs administered, if indicated. In the hands of specially trained personnel this treatment added to the comfort of the patient and minimized disfigurement. In the absence of a maxillofacial team, however, extensive intervention at this point might do more harm than good, and evacuation hospitals were frequently instructed to limit their maxillofacial treatment under such circumstances to conservative measures to prevent infection and the application of new bandages and temporary fixation.²⁹

6. As soon as it was safe for a patient with a maxillofacial injury to leave an evacuation hospital, he was usually transferred by train, plane, ambulance, or ship to a general hospital in the communications zone. Here he was put in the care of a team which included a plastic surgeon, an oral surgeon, an anesthetist, and specially trained assistants. His wound was thoroughly cleaned and nonviable tissue and bone removed; permanent fixation was applied; drainage was provided and infection, if any, controlled; eventually the wound was closed in a way which would best facilitate future plastic repair. If the injury was not too serious the patient might be retained at this point until he could be returned to duty. In most instances, however, the severe nature of maxillofacial wounds and the probable need for future plastic operations made it advisable to return the patient to the Zone of Interior when he could be transported without danger. Maxillofacial patients were given a high priority for air evacuation, and in a single 5-month period in 1945, 4,907 casualties with head and neck injuries were returned by air from overseas areas.³⁰

Circumstances often made it necessary to modify the "type" procedure described. In the invasion of a Pacific island, for instance, a wounded man might be taken directly from the beach to a ship having medical facilities on board and transported to a general hospital in a rear area without passing through any of the installations mentioned. Patients from a battalion aid

²⁹See footnote 10, p. 298.

³⁰Leibowitz, S.: Air evacuation of sick and wounded. Mil. Surgeon 99: 7, Jul 1946.

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station were sometimes taken directly to an evacuation hospital if there was sufficient cover for ambulances to reach the aid station without being fired upon, while if there was no cover at all patients might have to be treated in a battalion aid station or a collecting station until nightfall or until the enemy was driven from the immediate area. In general, however, the following cardinal principles were observed: the patient was removed from the combat area with all practical speed with only the most urgent treatment given en route, and definitive care, especially that which involved removal of tissue or bone, was delayed until he could be put in the hands of qualified plastic and oral surgeons.

THE MOBILE DENTAL OPERATING TRUCK OVERSEAS³¹

The need for a mobile operating truck overseas was based on the following general considerations:

Any practical means of bringing convenient base equipment into the combat zone could be expected to increase materially the efficiency of dentists with tactical units.

Many small units had no regular dental officers and depended upon itinerant facilities for their dental care. Officers assigned to such duty required equipment which was both efficient in operation and readily transportable, with time lost for packing and unpacking supplies reduced to a minimum.

Requests for mobile operating trucks were received from overseas units early in World War II, but development was exceedingly slow and delivery in quantity did not start until the spring of 1945.

Since the official model of the operating truck did not arrive overseas until shortly before the end of hostilities, reports on its functioning were meager, though uniformly favorable.³² However, more elaborate reports are available on the many improvised operating trucks placed in operation before the arrival of the standard vehicle.

In the absence of an official model, almost every theater managed to assemble a considerable number of improvised dental operating trucks of widely varying characteristics. In many cases these were built by small organizations with captured and makeshift equipment, but in Italy the Fifth Army went so far as to authorize the construction of dental trailers on standard bodies in the ratio of five trailers for each infantry division.³³ The following reports are typical of a large number received:

Fifth Army. As in the case of the mobile prosthetic trucks, the mobile operating trucks could function under any conditions, and by seeking out the

³¹For a description of the mobile operating truck see chapter V. The history of the development of this item has been told in Johnson, J. B., and Wilson, G. H.: History of wartime research and development of medical field equipment. HD.

³²Ibid.

³³Rpt, 5th Army Sec, supp. to Dental History, MTO. HD.

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patient saved an inestimable number of man-hours which would otherwise have been consumed by patients travelling to a point where their needs could be met.³⁴

Twelfth Air Force. In May 1943 it became increasingly evident that a great deal of operating efficiency at the chair was being lost due to the time required to set up and tear down the dental equipment before and after an organizational move. At this time efforts were directed toward construction of a number of complete dental offices in covered trucks or trailers which were to remain in operative condition during an overland move.

One such unit was constructed at the direction of the surgeon of the Twelfth Air Force in the 809th Engineer Aviation Battalion. At the same time another mobile unit was being manufactured by ... the 560th Signal Air Warning Battalion. These two units proved so successful in giving dental attention to outlying stations and facilitating the service as a whole that coordinated efforts were continued along this line. . . . Through the individual efforts of the organization dental officers and with the cooperation of the Ordnance Section of both the Twelfth Air Force and the Twelfth Air Force Service Command, nine mobile dental units were in operation 1 February.³⁵

There could be no doubt of the superior convenience of the mobile operating truck over the dental facilities available in the

M. D. Chest No. 60, and there was every reason to believe that similar vehicles would henceforth be considered essential to the dental service overseas and in maneuver areas in the United States. However, in determining the extent to which mobile units would eventually supplant dental field chests several other factors had to be considered. In the first place, the operating trucks were not a substitute for large, conveniently equipped clinics, wherever the latter were practical. Further, the mobile units cost about \$9,000 each, while the Chest 60 cost only a little over \$300. Obviously it would be necessary to determine whether or not manpower and materials would be available for the construction of several thousand operating trucks in a time of national emergency before this item could be adopted as standard equipment for any large proportion of the dentists with the field forces. Also, the mobile units were not adapted for use in jungle areas or on small Pacific islands where a chest which could be carried by hand might actually be more mobile than a truck.

It is highly probable that future experimentation with mobile units will find means to reduce materially both the cost and the weight of the dental operating truck, possibly by installing lighter equipment in a trailer or in a smaller self-propelled vehicle. In 1945 the Director of the Dental Division recommended further study along these lines.³⁶

³⁴See footnote 33, p. 311.

³⁵Rpt, 12th AF Sec, supp. to Dental History, MTO. HD.

³⁶Final Rpt for ASF, Logistics in World War II. HD.

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THE PROSTHETIC SERVICE OVERSEAS

World War I

The more rigid physical requirements which were in effect during most of the First World War prevented the induction of such large numbers of dental cripples as were accepted for full military duty in World War II. Also, the early end of World War I brought demobilization of the Armed Forces before the full effect of meager overseas prosthetic facilities could be felt. As a result, the provision of prosthetic dental appliances for the personnel of the American Expeditionary Forces in 1918 and 1919 was a comparatively minor problem. Only 13,140 new dentures and repairs were completed in France from July 1917 through May 1919. Of these only 2 percent were full dentures.³⁷ Only 1 soldier out of each 150 men in the AEF was provided any denture service overseas.

In World War I, laboratory equipment was initially furnished abroad only in base hospitals, evacuation hospitals, and in certain large clinics in the principal centers of population. Installations which were called central dental laboratories were established in base sections and depot division areas but these laboratories functioned mainly for the camps in which they were operating, usually taking impressions as well as completing the fabrication of cases. No official laboratories were set up specifically to process appliances from impressions taken within the smaller organizations. No prosthetic facilities were provided in the combat divisions and men in those commands who needed dental replacements had to be sent to a hospital or to one of the large clinics in the communications zone.

It was soon apparent that there was urgent need for prosthetic equipment within combat units to avoid unnecessary evacuation of personnel. A man sent to a base hospital for construction of dentures might be lost to his organization for as long as a man hospitalized with a moderately serious wound, and the mere fact that a soldier had to leave the combat zone for any type of prosthetic treatment encouraged the willful destruction of dental appliances and increased the demand for replacements which could not be considered essential. The experience of one division dental surgeon graphically illustrates the situation which sometimes arose. This officer was called to investigate a report that due to absences for construction of dental appliances the strength of one company of an infantry regiment was being dangerously reduced. He found that the trouble had started several days before when a single officer had been authorized to go to Paris for construction of a needed replacement. The following day several persons with more or less legitimate requirements had requested the same privilege. On the third day approximately a dozen had reported for this purpose, and on the fourth 20 men, many of whom were merely hopeful, asked

³⁷The Medical Department of the United States Army in the World War. Washington, Government Printing Office, 1927, vol II, p. 121.

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to be sent to Paris. It was necessary to limit further evacuations from that company to cases approved by the division dental surgeon.³⁸ As a result of such experiences, which were repeated in less exaggerated form in many divisions of the AEF, a special prosthetic chest weighing about 200 pounds was assembled and issued to each division as it entered the final phase of combat training.³⁹ This chest was used to establish a laboratory in the division field hospital where it effectually prevented the evacuation of troops for dental care. Other changes in the overseas prosthetic service during World War I were of minor importance.

World War II

With the experience of World War I in mind the Dental Division was careful to make what was considered ample provision for prosthetic facilities in theaters of operations. Tables of organization in effect at the start of World War II authorized dental laboratories in many convenient installations in the communications zone and as far forward into the combat zone as they could safely be operated.

In rear areas small permanent laboratories were provided in all general hospitals and in all station hospitals of more than 50-bed capacity; later they were also supplied in convalescent camps and convalescent centers.

Though central dental laboratories were not specifically prescribed for overseas use, it was anticipated that they could be obtained on special tables of organization when required.

In the combat zone, fixed or semifixed laboratories were of course impractical, but the portable equipment contained in the M. D. Chests Nos. 61 and 62 was provided all convalescent hospitals, evacuation hospitals, and field hospitals. Portable laboratory equipment was also carried by the medical battalion assigned to each division. The field sets, with their hand-operated lathes and lack of protection from the elements, were not suitable for large scale production but they brought laboratory facilities within easy reach of the fighting man. The Dental Division also expected to obtain modern laboratory trucks for the use of prosthetic teams in the combat zone,⁴⁰ and after July 1942 three mobile units were authorized, in theory at least, for each of the auxiliary surgical groups supposed to be assigned to field armies. In spite of these facilities, however, the provision of prosthetic replacements overseas proved to be one of the major problems of the Dental Service during the first years of the war.

Difficulties in providing adequate prosthetic care overseas resulted mainly from the fact that demands for dental appliances greatly exceeded all calcu-

³⁸Personal experience of Maj Gen Thomas L. Smith who was dental surgeon of the 80th Infantry Division, AEF.

³⁹See footnote 37, p. 313.

⁴⁰Fairbank, L. C.: Prosthetic dental service for the Army in peace and war. *J. Am. Dent. A.* 28: 801, May 1941.

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lations. In contrast with the total of 13,140 dentures constructed in France during the First World War, 845,000 prosthetic cases were completed for military personnel outside the United States in the 4 years from 1942 through 1945; an additional 20,000 appliances were constructed for civilians and prisoners of war.⁴¹ The following prosthetic operations of various types were completed for each 1,000 men overseas during the 3-year period 1943-45:⁴²

<i>Year</i>	<i>Full dentures</i>	<i>Partial dentures</i>	<i>Repairs</i>	<i>Total</i>
1943	10.0	28.1	19.9	58.0
1944	12.3	37.9	29.4	79.6
1945	9.2	40.3	33.6	83.1
Yearly average	10.5	37.2	29.6	77.4

Theater reports in 1944 placed the proportion of overseas personnel wearing dentures at about 10 percent.^{43 44 45 46}

In every area the dental laboratories were pushed to the limit of their capacity. The Dental Division reported that 7.2 prosthetic operations were completed for each 1,000 men overseas in the single month of August 1944.⁴⁷ The Fifth Army in Italy found that 9 men per 1,000 required prosthetic treatment every month.⁴⁸ The First Army in France reported that "the construction, reconstruction, and repair of dental prostheses is the main dental problem that we have had to contend with."⁴⁹ A single prosthetic team on a Pacific island (Saipan) constructed 300 dentures a month,⁵⁰ and on the Anzio beach-head, where 1 dental officer was killed, 5 wounded, and 1 captured, laboratories in tents protected by sand bags completed 373 cases under constant shelling and bombing during March 1944:⁵¹

The unexpectedly large requirements for prosthetic treatment overseas may be attributed to a number of factors. Early in the war it was necessary to ship personnel to foreign areas before essential dental care could be completed, and these men often needed replacements on arrival in the theater. Many cases were started in the United States but not completed before departure of the patient, and nearly all of the dentures made under these circumstances were either lost in shipment or reached the individual after so many months that they were useless. In the rush to get troops ready for duty abroad prosthetic appliances were unavoidably placed too soon after extraction and the dental surgeon of the European theater reported in 1943 that 10 percent of

⁴¹Data compiled by author from reports in the files of the Dental Division, SGO, 1947.

⁴²Ibid.

⁴³ETMD Rpt, SWPA, 6 Jul 44. HD: 350.05.

⁴⁴Quarterly Rpt of Dental Activities, Hq Base Section No 3, SWPA, 20 Apr 44. HD.

⁴⁵Medical History 1312th Engineer General Service Regiment, SWPA, May-Jul 1944 (4 Jul 44). HD.

⁴⁶Quarterly Dental History, Hq Base E, SWPA, 23 Jul 44. HD.

⁴⁷Memo, Maj Gen R. H. Mills for Technical Div, SGO, 18 Nov 44. SG: 400.34.

⁴⁸See footnote 33, p. 311.

⁴⁹Dental History, 1st Army, 18 Oct 43 to 30 Jun 44. HD

⁵⁰Annual Rpt, 148th GH (Saipan), 1945, p. 24. HD.

⁵¹Cowan, E. V. W.: North African Theater. Mil. Surgeon 96: 142, Feb 1945.

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the men who received prosthetic treatment shortly before shipment were unable to wear their appliances on arrival in England.⁵² The lack of prosthetic facilities in forward units early in the war also encouraged carelessness in the handling of dentures since loss or willful destruction of an appliance might lead to evacuation from a combat area.

All of these factors were secondary, however, to the simple fact that an unexpectedly large number of men who required dental appliances had been taken into the Army, thus increasing the demand for both initial and maintenance treatment far beyond what had been anticipated. Many of these dental cripples had already been supplied replacements when they arrived overseas, but dentures are necessarily fragile and require occasional reconstruction to compensate for gradual changes in the oral structures. Others, borderline cases, needed appliances after the loss of only one or two additional teeth. The Fifth Army reported:⁵³

It is of interest to note how quickly prosthetic needs appear in newly arrived divisions (85th, 88th, and 91st) even though these divisions' troops embarked for overseas duty with all dental requirements fulfilled. Also of significance is the rate of new dentures and the rate of denture repairs within veteran divisions (1st Armored, 34th, 36th, and 45th).

When nearly 500,000 men overseas were wearing one or more dentures it is not surprising that over 800,000 cases were completed during 4 years of field operations. Prosthetic requirements overseas, though not as great as in the large camps receiving recent inductees in the United States, were somewhat greater than for noncombat troops living under relatively stable conditions, but the bulk of the prosthetic treatment rendered overseas was routine in nature and would have been necessary wherever an equal number of men had been on duty.

The situation resulting from the unexpected demand for prosthetic service overseas was further complicated by the removal, early in the war, of all portable laboratory equipment from medical battalions and regiments, from the 400-bed evacuation hospitals, and the field hospitals. Very little correspondence has been found to explain this important action, and it was apparently based largely on informal agreements. As nearly as can be determined the Army Ground Forces and the Dental Division, the two agencies most concerned, were actuated by entirely different motives. The AGF had streamlined the division and was anxious to keep noncombatant personnel and equipment in the combat zone to a minimum. The Dental Division, on the other hand, certainly had no intention of leaving the forward areas without prosthetic service, but it was equally anxious to substitute laboratory trucks for the less efficient portable outfits and it appears to have concurred in the proposed action in the belief that the trucks would be able to provide an even better service by the time the field chests were removed.⁵⁴ This optimism was later proved premature since

⁵²Personal Ltr, Col William D. White to Maj Gen R. H. Mills, 22 Oct 43. RD: 703 (ETO).

⁵³See footnote 33, p. 311.

⁵⁴Memo, Col Rex McK. McDowell for Insp Br, Plans Div, SGO, 15 Jan 44. SG: 703.

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development of the trucks lagged and delivery did not start until the summer of 1944.

In any event, the Dental Division recommended in November 1942 that the field laboratory chests be removed from all medical battalions.⁵⁵ No further correspondence has been found on this recommendation but it is apparent that oral approval was granted and the portable sets were removed not only from the medical battalions but also from the smaller evacuation hospitals. Changes in equipment lists were made very informally at this time, often by undated pencilled notations; it is therefore not clear exactly when the field chests were eliminated, but by 7 September 1943 the Dental Division noted that "with the exception of the 750-bed evacuation hospitals and the convalescent hospitals the prosthetic service in an army area is provided only by the prosthetic teams, of which there are three in the auxiliary surgical group."⁵⁶

Removal of Chests 61 and 62 from the medical battalions and small combat zone hospitals left the divisions with no prosthetic service whatever and drastically reduced the facilities of the armies. Even with the 3 prosthetic teams which had been added to the auxiliary surgical group, an army of 10 divisions, with 3 evacuation hospitals and 1 field hospital, suffered a net loss of 11 field laboratories. The mobile laboratories of the auxiliary surgical group were expected to function with more efficiency than the equipment carried in chests, but the trucks were not available until well into 1944, a year after the field chests were eliminated.

The hospitals of the communications zone were already busy providing prosthetic treatment for their areas and they could increase their output only to a limited extent. Also, since patients had to be sent from many miles away, hospitals had to devote beds needed for the care of the wounded to men who required only a place to sleep and eat while their appliances were being constructed. At one time in 1943, 250 prosthetic patients occupied beds in general hospitals of the Mediterranean Base Section.⁵⁷ In March 1943 the dental surgeon of the North African theater reported:⁵⁸

At present there are thirty-five patients occupying beds in the 21st General Hospital, awaiting denture prostheses as part of their medical treatment. The 64th Station Hospital is servicing an engineer regiment of the 6th Corps. This regiment is soon to move east and has over 50 denture cases awaiting treatment. . . . The 7th Station Hospital is constantly being asked by organizations within a radius of 80 miles to hospitalize men for full or partial denture work, and at present is dated up to the first day of May, 1943.

The necessity for evacuating prosthetic patients from combat areas also resulted in great loss of manpower. The dental surgeon of the China-Burma-India theater reported that it often took a month for a man to be shipped to a

⁵⁵Memo, Col Rex McK. McDowell for Supply Serv, SGO, 3 Nov 42. SG: 400.34-1.

⁵⁶Memo. Brig Gen R. H. Mills for Oprs Serv, SGO, 7 Sep 43. SG: 322.15-16.

⁵⁷See footnote 51, P. 315.

⁵⁸Ltr, Col E. W. Cowan to Surg. NATOUSA, 13 Mar 43, sub: Dental needs in the theater of operations, incl to personal ltr, Col. William D. White to Brig Gen R. H. Mills, 7 Apr 43. HD: 703 (ETO).

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hospital, have his work completed, and return to his unit.⁵⁹ The dental surgeon of the North African theater stated that one of his biggest problems was to prevent the evacuation of men from combat areas for prosthetic treatment.⁶⁰ When hospitals were flooded with wounded any patients not requiring immediate care to save life were sent to the rear as rapidly as possible to make room for the more seriously injured, and under these circumstances the evacuation of a prosthetic case might go to fantastic lengths. One man who reported for repair of a denture in Sicily eventually arrived in North Africa, after passing through four hospitals with such speed that he was never seen by a dentist.⁶¹ Even when prosthetic cases could be handled on an outpatient basis results were not too good since either the patient or the hospital might be moved before the denture could be completed.

The situation resulting from the drastic reduction in prosthetic capacity in forward units soon led the theaters to take independent and unofficial action to restore at least part of the lost facilities. The European and North African theaters issued field chests to evacuation hospitals and medical battalions on their own responsibility.⁶² ⁶³ The Southwest Pacific theater issued them to field hospitals as well.⁶⁴ In general, in every important theater the portable laboratories were restored at least to the medical battalions with divisions. Most theaters went further and anticipated the arrival of approved laboratory trucks by improvising models of their own.

The Dental Division did not modify its original stand on removal of field laboratories from the divisions and combat zone hospitals but it did give tacit approval to the action of the theaters as an emergency measure by approving requisitions for enough Chests 61 and 62 to allow issue of the equipment in excess of the quantities authorized by tables of organization. In February 1944 the Dental Division briefly considered restoration of the portable laboratories to the medical battalions,⁶⁵ but in May of the same year stated "it is the opinion of the Dental Division that sufficient dental laboratory facilities will be available when the mobile dental laboratories are supplied to the units in the number called for by T/O's."⁶⁶ Since the mobile units were slow in arriving, Army Ground Forces suggested in November 1944 that the portable chests be returned to evacuation hospitals.⁶⁷ By this time, however, laboratory trucks were finally en route to the theaters and the Dental Division disapproved the recommendation of Army Ground Forces

⁵⁹Ltr, Col Dell S. Gray to CofS, Hq, USAF. CBI, 30 Jan 44, sub: Report of theater dental surgeon on trip to Calcutta, 8-22 Jun 44. On file as incl to ltr, Dell S. Gray to Col Rex McK. McDowell, 1 Jul 44. HD: 333 (Dental) CBI.

⁶⁰Interv, author with Col Lynn H. Tingay. Report of dental activities in the North African Theater of Operations, 29 Dec 44. HD: 00.71 (NATOUSA).

⁶¹History of the Army Dental Corps (MTO) 1943-44. HD.

⁶²See footnote 5, p. 293.

⁶³Chief Surg, NATO, Ltr 1, 6 Jan 44. HD: 314. (NATO).

⁶⁴Annual Rpt, Chief Surg, SWPA, 1944. HD.

⁶⁵Memo, Col Rex McK. McDowell for Col J. B. Mason, 4 Feb 44. SG: 444.4-1.

⁶⁶Memo, Maj Gen R. H. Mills for Oprs Serv, SGO, 18 May 44. SG: 444.4-1.

⁶⁷Memo, Maj Gen R. H. Mills for Insp Br, Oprs Serv, SGO, 4 Nov 44. SG: 400.34.

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and restated its position that the laboratory trucks were the real answer to the prosthetic problem in the combat zone.⁶⁸ By the end of 1944 the improvised laboratory trucks and the field chests which had been issued in excess of tables of organization, plus the newly arrived mobile units, had the prosthetic situation well in hand. Further recommendations of the Dental Division were concerned principally with utilization of the laboratory trucks.

It cannot be said how many of the 865,000 prosthetic cases completed overseas were constructed with the portable sets or improvised laboratory trucks but the number was certainly important. The First Infantry Division, alone, completed 1,945 appliances in 1 year.⁶⁹ During 1944 a total of 15,288 cases was constructed by units of the Fifth Army, and 3,503 new dentures and 2,081 repairs were completed within combat divisions of that Army in the same period.⁷⁰ The unhappy results of removal of the divisional prosthetic service, and the amount of work which was accomplished after some facilities had been restored, left no doubt that dental laboratories were essential in the forward areas.

The importance of an adequate prosthetic service as a morale factor was unexpectedly demonstrated by an embarrassing experience in the North African theater in 1943. This theater was established at a time when earlier physical standards had been drastically lowered, men were still being shipped

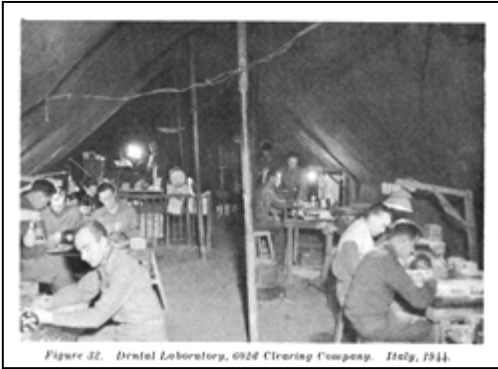


Figure 32. Dental Laboratory, 602d Clearing Company. Italy, 1944.

⁶⁸See footnote 47, p. 315.

⁶⁹Annual Dental Rpt (1944), 1st Division, 25 Jan 45. HD.

⁷⁰See footnote 33, p. 311.

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Figure 33. Small Prosthetic Laboratory in the Field. France, 1944.



Figure 34. Improvised Prosthetic Truck with the Fifth Army. Italy, 1944.

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Figure 35. Gold and Clasp Room, Central Dental Laboratory No. 1. London, 1943.

overseas before completion of their dental work, and the portable laboratories had just been removed from a large number of combat zone medical organizations. Consequently the prosthetic service in North Africa was at a low ebb in 1943. General Eisenhower had asked that mail censors tabulate the complaints noted in soldiers' letters, and to the astonishment of all concerned the Dental Service took first prize with "gripes" relative to the inability of getting dental replacements.⁷¹ The fact that troops getting their first taste of action were more voluble about difficulties in getting dentures than about defects of food or the discomforts of combat showed that the prosthetic service was almost as important to morale as to health.

Utilization of the Mobile Prosthetic Trucks

Long before the first laboratory trucks (described in Chapter V) were delivered overseas considerable difficulty had been encountered in finding organizations to which the prosthetic teams could conveniently be assigned. Since the mobile laboratories had to move from unit to unit and from area to area on short notice they could not be assigned permanently to the small individual commands which they served. They were initially too few in number to be assigned even to divisions. They could have been given to field armies in the combat zone, but large headquarters frequently protested at having their staff personnel involved in the detailed administration of minor units. It was

⁷¹See footnote 51, p. 315.

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Figure 36. Dental Laboratory of the 181st General Hospital. India, 1944.

felt in the Dental Division that until the value of the trucks had been proved the Army Ground Forces, which had to approve any change in the organization of combat units, would vigorously oppose any proposal to add them to the tables of organization of any large line unit. To avoid controversy with Army Ground Forces the Dental Division therefore recommended that the mobile laboratories be added to a medical unit, the organization of which was a responsibility of the Medical Department.⁷²

Obviously the prosthetic teams, whose functions were unrelated to most medical activities, could not conveniently be added to hospitals or most other large medical units. The auxiliary surgical group, however, was itself a catchall, composite, organization of just such semi-independent, highly specialized, medical units, and the prosthetic teams could be incorporated in its tables of organization without materially disrupting its operations. In July 1942, therefore, almost 2 years before the trucks became available in quantity, 3 prosthetic teams and laboratory trucks were added to a new table of organ-

⁷²Personal interview between author and Colonel Beverly Epps who was on duty in the Dental Division, SGO, during most of the war.

ization for this Unit.⁷³ M. D. Chests Nos. 61 and 62 were substituted for the trucks pending arrival of the latter. It had been planned originally that one auxiliary surgical group would be assigned to each army, but no specific allotment had been authorized. By 7 September 1943 estimates of the number of auxiliary surgical groups to be organized had been reduced to a total of 5, and in addition The Surgeon General was recommending that only 2 prosthetic teams be included in each group. The total of 10 prosthetic teams which would have been provided overseas by 5 auxiliary groups was only a fraction of the number urgently needed and the Dental Division recommended that the teams be deleted from the surgical groups and added to the general headquarters of a theater in the ratio of one for each division or equivalent number of troops.⁷⁴ The Surgeon General disapproved this recommendation on the grounds that since the tables of organization of a general headquarters was the concern of Army Ground Forces, the latter should be requested to initiate the change. The Surgeon General also recommended that the Dental Division plan on supplying prosthetic trucks overseas in the ratio of 2 for each 3 divisions, but added the ambiguous statement that they should be shipped only on request of the theaters concerned in a ratio not to exceed one per division.⁷⁵ The Dental Division then asked the surgeon, Army Ground Forces, to approve a, table of organization embodying the recommended modifications, but no action was taken on this request.⁷⁶ It is known that general headquarters of the European theater opposed the assignment of incidental units to its overhead and it is probable that this attitude was reflected in Army Ground Forces headquarters in Washington.⁷⁷

Early in 1944 the proposed reorganization of two medical installations made it possible to continue the assignment of the prosthetic teams, as before, to medical units. On 17 March 1944 a new T/O 8-667, Medical Depot Company, provided for 2 prosthetic teams in that organization, which was expected to serve about 75,000 troops.⁷⁸ On 23 April 1944, the auxiliary surgical group was absorbed into a new "medical service organization" which included prosthetic trucks "as needed."⁷⁹ In a memorandum to the Operations Service, SGO, on 4 February 1944, the Dental Division stated that the prosthetic teams in the medical service organization would be able to provide mobile prosthetic service in the communications zone and that the teams with the medical depot companies would do the same for the combat zone.⁸⁰

Neither assignment worked out as planned, however. A change in the tables of organization for the medical depot company in August 1944 provided

⁷³T/O 8-571, 13 Jul 42.

⁷⁴See footnote 56, p. 317.

⁷⁵Memo, Col Arthur B. Welsh for Dental Div, SGO, 11 Sep 43. SG: 322.3-1.

⁷⁶Memo, Brig Gen R. H. Mills for Surg, AGF, 13 Sep 43. SG: 322.3-1.

⁷⁷Info from Maj Gen Thomas L. Smith, former dental surgeon, ETO.

⁷⁸T/O 8-667, 17 Mar 44.

⁷⁹T/O&E 8-500, 23 Apr 44.

⁸⁰See footnote 65, p. 318.

that 1 unit would serve 125,000 troops instead of 75,000, leaving only 1 prosthetic team for each 62,500 personnel.⁸¹ The authorization of prosthetic teams in the medical service organization "as needed" also proved too vague and was generally not interpreted to provide an adequate number of trucks in the communications zone. Because of the prospective reduction in the number of prosthetic teams in the combat zone, incident to the change in the medical depot company, the Dental Division recommended in November 1944 that the trucks be made available directly to armies in the ratio of 1 mobile unit for each 30,000 men.⁸² Though this proposal was not put into effect, approximately the same result was attained on 18 January 1945 when the number of teams assigned to the medical service organization was increased to "one for each 30,000 troops," apparently anticipating that the needs of both the combat zone and the communications zone would henceforth be met from this unit.⁸³ Finally, when the division dental service was reorganized in June 1945, one prosthetic team was authorized for direct assignment to the dental detachment of each division.⁸⁴ The previous allotment of trucks to the medical service organization was not rescinded at this time, however, and at the end of hostilities the prosthetic teams were authorized, in theory at least, both in the ratio of 1 for each division, in the dental detachment, and 1 for each 30,000 total strength of a theater, in the medical service organizations. It is probable that correction of this duplication was delay pending expected changes in the organization of the Army following the war.

The actual utilization of the prosthetic teams overseas was highly complex and followed no definite pattern. Flexibility of operation, which was essential to meet unexpected situations, often necessitated wide and unorthodox variations from the plan contemplated in tables of organization. In the European theater, for instance, three teams were assigned to a central dental laboratory where they were available on short notice for use in any area. These three teams were given blanket orders every month to proceed to any part of the theater "to carry out the orders of the theater commander." The theater dental surgeon, in turn, could move the teams at any time by a telephonic order, giving him a small reserve pool of prosthetic personnel and equipment to meet emergency situations. Other teams were assigned to the base sections where they operated under the base section dental surgeons. Several teams were assigned to the communications zone for replacement of units which might be lost to combat organizations, but these teams were temporarily loaned to army replacement depots which were overburdened with work for new men; eventually they were turned over to the armies. Other teams were assigned to the combat armies, either directly or as part of medical depot companies. The army units in the European theater were utilized in various ways. Some were

⁸¹T/O&E 8-667, C 1, 11 Aug 44.

⁸²See footnote 47, p. 315.

⁸³T/O&E 8-500, 18 Jan 45.

⁸⁴See footnote 9, p. 297.

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kept under army control; others were in turn attached directly to divisions. Some had their overhead functions carried out by a parent organization; others were nearly independent, relying on the units to which they were attached for little more than rations and housing. About the only generalizations which can be drawn are that the teams were seldom assigned to the auxiliary surgical groups or the medical depot companies of which they were ostensibly a part, and control was generally retained in one of the higher headquarters where the dental surgeon could utilize the limited number of teams in the best interests of the whole command. The official assignment of laboratory trucks to individual divisions, under T/O 8-16, was not directed until June 1945, near the end of hostilities.⁸⁵

Evaluation of the Mobile Prosthetic Trucks. Reports from every theater confirmed the value of the prosthetic trucks. During the fighting in France the First Infantry Division, for instance, had made it a practice to set up the Chests 61 and 62 only when it appeared that no move would be necessary within 3 days. When the division reached Belgium it obtained a mobile laboratory and thereafter the prosthetic clinic operated whenever it could count on a single day in any given location.⁸⁶ The Ninth Infantry Division reported "prosthetic dental chests cannot be used efficiently in bivouacs of short duration. A mobile dental laboratory is essential to meet the prosthetic needs of a division."⁸⁷ A general board which made a study of medical activities in Europe at the end of the war found that:⁸⁸

A large number of mobile laboratories and operating units are required in warfare involving rapid movement, and when attached to divisions provide uninterrupted dental care and eliminate the evacuation of troops from divisional areas. It has been found that mobile dental units can offer the maximum service to forward units. The extreme value of the mobile type of prosthetic unit was proved beyond all question once the lines had become extended beyond the point at which semifixed installations were effective.

The Director of the Dental Division stated in 1945:⁸⁹

The mobile dental laboratory is a most useful, efficient and economical mechanism for the rendering of prosthetic laboratory work in Army areas, in the communications zone, on maneuvers in the continental United States, and in certain isolated stations in the United States.

In spite of the success of the mobile dental laboratories, however, it would be a mistake to regard them as the final, universal answer to all prosthetic problems, even in the field. They brought modern equipment to the combat zone where it was badly needed, but in other areas, where mobility was of less importance, the prosthetic trucks could not equal the efficiency of larger, fixed

⁸⁵Data on the use of the dental prosthetic trucks were seldom a matter of record. Information given here has been assembled by the author by means of interviews with senior dental surgeons.

⁸⁶See footnote 69, p. 319.

⁸⁷Annual Rpt, 9th Division, ETO, 1943, 21 Jan 44. HD.

⁸⁸Interviews, The General Board, USFET Medical Section, ETO, vol IV, HD: 334.

⁸⁹See footnote 36, p. 312.

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or semifixed installations operating day after day under relatively stable conditions. It is difficult to obtain figures on the output of the prosthetic teams, but 5 mobile units of the First Army completed an average of about 1.5 cases per technician per working day during 5 months in 1944 and 1945, compared with an average for large laboratories of about 2.5 cases per technician per working day.⁹⁰ The mobile units were admittedly crowded, and since the equipment was tied to its means of transportation, operations had to be suspended when the truck was used to carry water or supplies, or when normal maintenance was required. Time was lost in moves and several days might elapse after a change of location before all troops in the vicinity could be notified that prosthetic services were available.

In divisions the need for mobility outweighed all other considerations. The prosthetic laboratory had to be ready to move on short notice and to function when no more than 24 hours could be spent in any given location. Time lost in packing and unpacking equipment with every move would have offset any advantage of setting up in more spacious quarters even if permanent buildings had been available. Dental surgeons were therefore generally agreed that only a completely mobile unit, with built-in equipment, could meet the prosthetic needs of a division with reasonable efficiency. For

similar reasons it was necessary that armies, and even higher headquarters, should have at least a few prosthetic teams which could be used to meet emergencies or for assignment with small commands which for any reason could not use the central dental laboratories. But while the mobile dental laboratories probably did more to improve the prosthetic service than any other wartime development, they were not a substitute for the larger fixed laboratories wherever the latter could be used.

The prosthetic trucks also had certain limitations under special conditions. On small island areas, for instance, usefulness of the mobile units was limited by lack of roads, and in addition the trucks were usually given a low priority in an invasion. For some time after a beachhead was established prosthetic service had to be rendered from field chests.⁹¹

The mobile units themselves might be expected to undergo modification from time to time, though at the end of the war the line which future development would take was not clear. One important defect, the fact that operations had to be suspended whenever the truck was moved, could of course be eliminated by mounting the equipment in a trailer, but it was feared that this change would make it easier for commanders of units to which the laboratories were attached to appropriate the trucks, leaving the prosthetic teams worse off than before. A truck and trailer combination would also be less able to negotiate unfavorable terrain. It was further noted that whenever a prosthetic team could expect to be in a given location for any considerable length of time, as much of the equipment as possible was usually unloaded from the truck and

⁹⁰See footnote 10, p. 298.

⁹¹See footnote 36, p. 312.

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set up in any available permanent shelter. It was therefore suggested that prosthetic teams assigned in the rear of the combat zone or in other areas where frequent movement was less essential, should be supplied cargo trucks and equipment designed for use in a building or tentage. The necessity for supplying a highly mobile prosthetic service well forward in the combat zone was proved beyond all doubt, but the means by which it would be rendered would probably need to be reexamined periodically in the light of changing conditions of warfare.

Central Dental Laboratories

It has been seen that the prosthetic needs of divisions and comparable combat units could be met only by small, mobile laboratories functioning in the immediate vicinity of the troops they served. Only a relatively small proportion of the personnel in a theater were assigned to combat commands, however; the remainder obtained replacements from some more permanent type of installation. Hospitals of the communications zone were authorized small dental laboratories but these were inadequate to meet the demands of large surrounding areas. The largest general hospital was allotted only two technicians and the largest station hospital had but one. Further, these dispersed installations could not be organized for maximum efficiency. This could be attained only when large numbers of skilled technicians repeated over and over the limited operations in which they were most proficient. As a result the hospital laboratories were unable to meet the enormous demands for prosthetic service in a theater of operations.⁹²

In the continental United States the bulk of routine dental laboratory service was provided by large central dental laboratories organized to function on a "production line" basis, but this type of installation had not been specifically authorized in tables of organization for overseas use. Failure to provide for central dental laboratories outside the United States was probably due in part to the fact that the magnitude of the prosthetic problem had been underestimated but there is reason to believe that other factors were also taken into consideration. First, the requirements of different theaters would obviously vary greatly and no single organization could meet the needs of every area. Also, a central dental laboratory must have rapid, dependable communications with all parts of the area it serves, and in the more backward regions, where United States troops first saw service, existing transportation facilities were often meager. The question of establishing central dental laboratories was therefore left to the individual theaters which could recommend special tables of organization to meet their own needs.

Central dental laboratories eventually proved practical and necessary in most of the major theaters. Considerable delay was encountered in getting

⁹²See footnote 3, p. 291.

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them in operation, however. Until a theater had been at least partially organized and the direction of its future development determined, the dental surgeon could not know how many troops would have to be served nor where he would have to concentrate his facilities. After these questions had been answered, he still had to get his tentative table of organization approved in his own headquarters and by the War Department, then wait for many months while personnel and equipment were, assembled and shipped. As a result most central dental laboratories were staffed with

men taken from hospitals or other dental installations. By this means a limited number of technicians were utilized with the greatest efficiency and laboratory service was provided for all on an equal basis, though hospital laboratories were robbed of needed personnel. The experience of the dental surgeon of the European theater, which was fairly typical, was described as follows:⁹³

It is to be noted that no provisions were ever made as far as I can find out for Tables of Organization for central dental laboratories in any theater of war. During the past few months I have often wondered why. My first official act on arriving in this theater was to have a cable sent to the Chief Surgeon requesting one central dental laboratory complete, for which there was both a T/O and a T/BA at the time. My reply was to requisition both personnel and equipment from here. This occurred on or about 1 July 1942, and those instructions were promptly carried out. Last week, after a delay of 15 months a few of these items requisitioned at that time arrived at one of our depots, but at this time have not yet arrived at the laboratories. In mentioning this it brings out a point which I wish to emphasize, that is the great delays which occur in wartime. I am wondering if it would be better to organize these units at home and send them forward with equipment and trained personnel like any other unit, rather than try to put them together in a new theater piece by piece. . . . The equipment which we now have in these laboratories has all been diverted from the hospitals for which it was intended.

An adequate central dental laboratory system, with nearly 150 technicians, was eventually established in England, but the fact that these facilities were not available for many months seriously hampered the prosthetic Service and delayed the treatment of men being prepared for the invasion of France.

The General Board, United States Forces, European theater, also reported:⁹⁴

There were sufficient dental personnel in units operating under approved tables of organization in the communications zone, European Theater of Operations, to perform the mission of the separate units. However, the dental personnel in these units were not able to provide for an adequate overall communications zone dental service, particularly at the larger headquarters and in cities such as London and Paris. Fairly adequate dental service was eventually provided by organizing non-tables of organization laboratories and clinics. There was a definite shortage of dental officers to provide this additional service and it was only accomplished at the expense of taking dental officers and technicians out of general hospitals, dispensaries and other medical units under communications zone control thereby reducing the efficiency of the

⁹³See footnote 52, p. 316.

⁹⁴See footnote 3, p. 291.

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dental service of these units. A great amount of improvisation was required as a result of failure to provide for adequate personnel and equipment in sufficient time to make the indicated service possible.

It would seem that considerable difficulty and delay would be eliminated if central dental laboratories for overseas use were established by tables of organization. Laboratories of the sizes required could then be requisitioned as units and shipped from the United States complete, ready to function on arrival.

Hospital Laboratories

During the war very few official changes were made in the authorized personnel or equipment of hospital laboratories. Unofficially, both personnel and equipment often had to be augmented to meet special situations. General hospitals of 1,000 beds or over were authorized two dental laboratory technicians; hospitals of less than 1,000 beds were authorized only a single technician or none at all. Since a single officer can keep approximately 5 technicians occupied it is obvious that the 1 or 2 men assigned to a hospital laboratory could not complete all the cases started by even one officer on full time prosthetic duty. When, as frequently happened, a hospital in an isolated location had to provide prosthetic service for all surrounding commands, its efforts to keep ahead of the flood of cases were doomed from the start even when it neglected the care of its own patients. Under these circumstances the theater dental surgeon had to attach up to a dozen men to the hospital laboratory which then acted as a subcentral laboratory for the area. Since, initially, the theater dental surgeon had no reservoir of personnel for such duties, they were usually taken from other units which needed them only slightly less urgently. Later in the war fixed prosthetic teams of a medical service organization were sometimes used for this purpose.

In the combat zone the 750-bed evacuation hospitals which were at one time responsible for almost all the prosthetic service in army areas, were particularly ill-equipped to handle such a task. When the installation was functioning in combat the 3 dentists and 3 assistants were fully occupied with other duties, so that the dental laboratory chests

were sometimes unopened for long periods of time. Almost all the dental officers interviewed by the European General Board recommended the addition of laboratory personnel to the tables of organization for the 750-bed evacuation hospital and restoration of the Chests 61 and 62 to the 400-bed hospital.⁹⁵ It is believed, however, that the opinions of most of these officers were based on their experiences during the period when the evacuation hospitals were vainly trying to provide all combat zone prosthetic service; the assignment of mobile prosthetic teams to divisions late in the war materially reduced the need for extensive laboratory facilities within evacuation hospitals and both the mission and organization of these units

⁹⁵See footnote 88, p. 325.

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seemed to indicate that they should not be expected to render any great volume of routine prosthetic treatment.

The experience of World War II demonstrated conclusively that: the laboratory personnel of the larger communications zone hospitals must be increased slightly if the dental service for hospital patients is to be adequately maintained, and hospital laboratories cannot provide prosthetic service for surrounding commands without extensive reinforcement of wartime tables of organization.

Summary

In the continental United States, with its rapid communications and large concentrations of troops, there was no question of the superior efficiency of large central dental laboratories staffed by experts and outfitted with the most modern equipment. In many overseas areas, however, a compromise had to be made between the efficiency of the large establishments and the convenience of the smaller, dispersed installations. The mobile prosthetic teams provided an acceptable solution of the laboratory problems of divisions and similar organizations though some dental surgeons felt that the teams could function better if their equipment were carried in a weapons carrier or light truck. In the rear areas of the communications zone, at least in those theaters where communications were not a major problem, it was generally agreed that the bulk of the prosthetic service should be rendered by central laboratories operating under stable conditions. Hospital laboratories could complete cases for their own patients and render occasional emergency care, for other personnel and, if effectively reinforced, might act as subcentral laboratories in isolated locations, but they should not be, expected to provide "mass production" facilities for the routine treatment of large commands. The need for approved tables of organization for overseas central dental laboratories was evident.

There was less agreement on the most effective prosthetic service for army areas in the rear of the combat zone where neither the mobile teams nor the central laboratories seemed to meet all requirements. Some army dental surgeons felt that extreme mobility was still essential even in regions where contact with the enemy was relatively improbable and recommended that field armies be provided enough of the prosthetic trucks and teams to care for all army troops. Others felt that while some mobility was essential it was not necessary to use built-in equipment with consequent limitation on space, and that communications in an army area were sufficient to allow some concentration of laboratory facilities into more efficient units. After a study of his prosthetic organization⁹⁶ one army dental surgeon expressed the following views:

1. While the prosthetic teams (preferably with demountable equipment mounted in light trucks) may be able to meet most of the laboratory needs of divisions, provision must also be made for the care of army troops, which in a type army have approxi-

⁹⁶See footnote 10, p. 298.

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mately the same total strength as the troops in the divisions and corps. About nine prosthetic teams are required to provide prosthetic care for the divisions of a type army and approximately equal facilities would be needed for army troops.

2. Instead of using nine separate prosthetic teams for army troops a more efficient service would result if the 27 technicians of these teams were grouped into a single "prosthetic detachment." This prosthetic detachment would have for the army prosthetic service the same advantages of centralization and control that the new division dental detachment offered for the division Dental Service. The detachment would have to be organized along cellular lines so that it could operate either as a large laboratory or as two or more smaller laboratories of not less than six men each. Equipment would be demountable and sufficiently mobile to be moved by trucks when required, but the army laboratories would be located so as to require changes of position as infrequently as possible.

Transportation needs would be reduced since only rarely would the whole laboratory have to be moved at one time. Since equipment would not be mounted in the trucks, these would be available for carrying supplies, picking up and delivering cases, or other necessary routine duties.

None of the many opinions quoted on the army prosthetic service was expected to offer the final solution of the problem, and it may be that no single plan would be uniformly applicable. It is possible, for instance, that the scheme for an army prosthetic detachment and a centralized army laboratory would have worked effectively in Europe where the road net was extensive, but it might have proved less satisfactory in the Pacific jungles. The significant point at this time is that while the needs of the divisions and the base areas were being satisfactorily met at the end of the war there was a fairly general feeling that the prosthetic service of the field army should be given further attention.