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THE GENERAL BOARD

United States Forces, European Theater

MEDICAL SUPPLY IN THE EUROPEAN THEATER OF OPERATIONS

MISSION: Prepare Report and Recommendations on Medical Supply in the European Theater of Operations.

The General Board was established by General Orders 128, Headquarters European Theater of Operations, US Army, dated 17 June 1945, as amended by General Orders 182, dated 7 August 1945 and General Orders 312, dated 20 November 1945, Headquarters United States Forces, European Theater, to prepare a factual analysis of the strategy, tactics, and administration employed by the United States forces in the European Theater.

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THE GENERAL BOARD
UNITED STATES FORCES, EUROPEAN THEATER
APO 408

MEDICAL SUPPLY IN THE EUROPEAN THEATER OF OPERATIONS

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MEDICAL SUPPLY IN THE EUROPEAN THEATER OF OPERATIONS

PART ONE

THEATER MEDICAL SUPPLY SERVICE

1. The Surgeon of the XII Corps made the following statement in his Annual Report of Medical Department Activities for the year 1944: "Medical supply has presented virtually no problem at all since the commencement of operations. Shortages in Medical Department items have neither been critical in type or in regard to quantity, and as a general rule, adequate substitutes have always been available." The statement quoted above echoes the opinion of a majority of the Medical Department officers and enlisted men in the European Theater of Operations, and it is generally agreed that under the able leadership of Colonel Silas B. Hays, Medical Corps, who became Chief of the Supply Division, Office of the Chief Surgeon, in February, 1944, the theater medical supply service performed its mission with eminent success.

2. This part of the study is devoted to the major difficulties encountered by the theater medical supply service in supporting the invasion, the measures taken to overcome these difficulties, and the conclusions and recommendations of the General Board with regard to future operations.

CHAPTER 1

MEDICAL SUPPLY SERVICE IN THE UNITED KINGDOM

3. Establishment of Medical Depots. The establishment of medical depots in the United Kingdom in preparation for the invasion of the Continent was governed by expediency rather than any plan prescribed by higher authority. As general depots were opened to support concentrations of troops, the medical supply service searched about for officers and enlisted men to operate the medical sections of such depots. At one time 16 medical depots and medical sections of general depots were staffed by troops on detached service from six field medical depot companies. As a result of overwork and the temporary nature of the assignment, morale and efficiency in the depots were not as high as the importance of their mission warranted. [1]

4. Medical Supply Build-up. The build-up of medical supply stocks in the United Kingdom in 1942 and 1943 was hampered by the critical status of many items in the United States, shortages in shipping, and submarine warfare. In order to meet the requirements of a steadily growing United States force it was necessary to resort to procurement from British sources. British procurement, however, was never entirely satisfactory; deliveries of urgently needed items were frequently delayed many months as a result of labor and raw material shortages and in many instances it was necessary to accept items of inferior quality. Since deliveries of items under British contracts were undependable, requisitions for the same items were usually

placed on the United States. This naturally resulted in many instances in duplication and an unbalancing of medical depot stocks. [1]

5. Lack of Central Stock Control System. By far the most serious deficiency in the medical supply service in 1942 and 1943 was a lack of an adequate system of central stock control. As a result, information as to stock on hand in depots was lacking and intelligent computation of theater requirements was impossible. [1]

6. Task Confronting the European Theater Medical Supply Service with the Adoption of Plan "OVERLORD". The adoption of plan "OVERLORD" for the invasion of the Continent presented three additional problems of major importance to the European Theater medical supply service:

a. Medical installations in the United Kingdom had to be equipped in anticipation of casualties to arrive from the Continent after the operation commenced. The hospitalization program called for about 90,000 beds in the United Kingdom by 1 May 1944. In addition a system of beach dispensaries at strategic points along the southern coast of England was necessary in the event of enemy air action and boat accidents during embarkation.

b. The medical units intended for employment on the Continent had to be properly equipped and packed. This included, in some instances, the supplying of complete unit medical assemblies to hospitals.

c. Maintenance medical supply stocks had to be assembled and prepared for the invasion force. This involved not only plans for immediate resupply of assault units, but also long range plans for medical supply build-up on the Continent. [1,2]

7. Difficulties Encountered in Preparation for Operation "OVERLORD" It became apparent by February, 1944, that the European Theater medical supply service was incapable of supporting forthcoming operations. Medical depots in the United Kingdom were attempting to discharge a dual responsibility with inadequate personnel; first, the distribution of normal maintenance supplies and tables of equipment shortages to fixed hospitals and tactical field units; second, a heavy program of assembling unit medical equipment for fixed hospitals in the United Kingdom and a large number of medical maintenance units for use on the Continent. As a result of this overburdening of depots neither function was performed satisfactorily. The assembly program in particular was far behind schedule. As of 1 February 1944, only 47,300 of the minimum requirement of 90,000 fixed beds were installed and functioning. The building of medical maintenance units, upon which medical supply support of the invasion forces primarily depended, had also been seriously retarded. [1,2]

8. Changes Effected to Correct Deficiencies. In order to investigate the situation and make necessary recommendations to correct existing deficiencies, the Voorhees Committee, headed by Colonel Tracey S. Voorhees, J.A.G.D., was sent to the European Theater of Operations in February, 1944, by the Surgeon General, United States Army. The recommendations of his committee were immediately adopted by the Chief Surgeon, European Theater of Operations, and by D minus 1, the medical supply service was in a position to adequately support the operation "OVERLORD". The changes effected were as follows:

a. The unit medical equipment assembly program for hospitals and medical maintenance units which was taxing the depots was shifted to the United States. With a few exceptions the assemblies were received promptly as scheduled.

b. The number of distribution depots in the United Kingdom was reduced and a key depot system for critical items established to prevent too wide a dispersion of stocks. This resulted in a more efficient supply of tables of equipment shortages to units and maintenance

supplies to operating installations.

c. A central stock control system was established in the Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, to facilitate intelligent computation of theater requirements and distribution of stocks among issue depots.

d. Qualified personnel to staff key positions in the Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, and in United Kingdom medical depots was requested and obtained from the United States.[1,2]

9. Conclusion. It is the conclusion of the General Board that the theater medical supply service in the European Theater of Operations would not have been able to support operation "OVERLORD" had not certain changes been effected as a result of the Voorhees Committee investigation.

10. Recommendation. It is the recommendation of the General Board that in future operations a definite plan for the progressive development of the medical supply service be prepared and placed in effect in advance of the arrival of medical supply stocks. The plan should take into consideration the following:

a. The most competent medical supply specialists must be made available to fill key positions in the Supply Division, Office of the Theater Chief Surgeon, United States Army, and in theater medical depots.

b. Provision must be made for staffing fixed medical depots either with permanent personnel or a suitable number of the proper type medical depot units.

c. An appropriate central stock control system must be established as early as practicable.

d. Theater medical supply requirements and availability of items in the United States must be carefully analyzed prior to initiating an extensive program of procurement from foreign sources.

e. A key depot system must be established to control critical items.

f. The burdening of theater medical depots with a major assembly program must be avoided.

CHAPTER 2

MEDICAL SUPPLY BUILD-UP ON THE CONTINENT

11. Plans for Medical Supply Build-up on the Continent. Under operation "OVERLORD" the medical supply build-up on the Continent was planned in three separate phases:

a. Initial resupply of assault forces from reserves carried ashore by divisional medical units supplemented by "Army and Navy EXchange Units."

b. Shipments from the United Kingdom from D-Day to D plus 90 under the "Pre-scheduled Supply Requirements Plan."

c. Shipments from the United States from D plus 91 to D plus 180 which would provide a balanced stock of approximately 60 days' supply in continental depots.

d. In general the medical supply build-up was carried out as planned with the exception of the last phase which met with certain unforseeable difficulties. 1,2

12. Initial Supply of Assault Forces. During the initial stages of the invasion the assault forces were resupplied from reserves of medical supplies carried ashore by divisional medical troops. To supplement these reserves with fast-moving items there were set up "Army and Navy Exchange Units" each consisting of 320 blankets, 100 litters, 3 chests of surgical dressings, 24 splint litter bars, 4 splint sets and 96 units of blood plasma. These units were carried on each LST destined for the far shore. A total of 300 units was transported in this manner and served adequately for initial casualties. 1,2,3

13. Shipment of Maintenance Supplies Under the "Pre-scheduled Supply Requirements" Plan. Although emergency shipments of special items, such as whole blood, penicillin, biologicals, litters and blankets were shipped by air when conditions permitted, the bulk of maintenance supplies were shipped under the provisions of SOP No. 4, Headquarters, European Theater of Operations, United States Army, Subject: "Pre-scheduled Supply Requirements for Continental Operations." This covered requirements for supply on the Continent for the period D-Day to D plus 90 inclusive. Except in the matter of packing discussed in a later chapter, the pre-scheduled shipment of maintenance medical supplies was carried out as planned and was judged highly successful inasmuch as serious shortages did not develop. The operation from the standpoint of requirements was divided into three periods as follows:

a. D-Day to D plus 14: First Army submitted requirements to the Office of the Chief Surgeon, European Theater of Operations, United States Army, indicating items and quantity desired on the Continent on D-Day and each day thereafter to D plus 14.

b. D plus 15 to D plus 41: First Army, Third Army, and Ninth Air Force submitted requirements to the Office of the Surgeon, Advance Section, Communications Zone, where they were consolidated and requisitions prepared for submission to the Office of the Chief Surgeon, European Theater of Operations, United States Army. These requirements were also set up by item and by day.

c. D plus 42 to D plus 90: Requirements for the period were determined by the Office of the Chief Surgeon, European Theater of Operations, United States Army, and were phased in on a weekly basis in accordance with tonnage allocations established for the Medical Department.

14. Shipment of Maintenance Supplies from the United States. The last phase in the medical supply program on the Continent called for a progressive build-up of a 60-days' level of medical supplies in Communications Zone depots between D plus 91 and D plus 180, based upon a series of requisitions placed on the United States. (This level was, in effect, a Communications Zone reserve and operating level and not a theater level inasmuch as no definite proportion of it was contemplated for the armies or for Advance Section, Communications Zone. Medical supplies once issued to armies were no longer carried on theater consolidated stock status reports. Advance Section, Communications Zone, as a separate command, was not allocated a certain per cent of Communications Zone level based upon the number of troops served.) The achievement of the 60-days' level was naturally dependent upon the timely arrival and discharge of cargoes. Because deep-water ports on the Continent did not become available as planned, many ships carrying medical supplies were diverted to the United Kingdom or remained off shore for a considerable length of time before unloading. For these reasons the planned build-up was not attained by D plus 180. With the capture of Antwerp and the opening of other channel ports, the desired level was eventually attained. The adequacy of this level was evidenced by the fact that once initial

shipping difficulties were overcome no serious shortage of medical supplies developed on the Continent. [1,2,4]

15. Conclusion. It is the conclusion of the General Board that the prior planning for the medical supply build-up on the Continent was excellent and had the Allies captured adequate deep-water ports as scheduled the desired levels would have been achieved.

16. Recommendation. It is recommended that in future operations similar plans be drawn up for the medical supply support of the invasion forces.

CHAPTER 3

PACKING AND CRATING OF MEDICAL SUPPLIES FOR THE INVASION

17. Packing of Unit Medical Equipment of Field and Evacuation Hospitals. The hinged, water-proof, amphibious box was used by field and evacuation hospitals for the packing of all supplies and equipment which could be adapted to it and which were not in original water-proof packages. As a result losses incurred by tactical hospitals due to damage in transit were reduced to a minimum. The amphibious box was found to be so excellently suited for packing equipment and supplies that the Office of the Chief Surgeon, European Theater of Operations, United States Army, subsequently attempted to procure a sufficient number for each tactical hospital in the theater in anticipation of redeployment to the Pacific. [2]

18. Packing of Maintenance Stocks. All maintenance supplies for the initial 60 days were skid loaded wherever possible, the theory behind skid loading being that a small warehouse was provided with the supplies. The average skid load approximated 1700 pounds in weight. Individual boxes were completely water-proofed and the entire skid load enclosed in a covering of eight-ounce, water-proof duck. After the top frame was applied, the skid load was securely strapped with one and one-fourth inch steel banding. Steel cable slings were attached to either end of each skid to facilitate loading and unloading and to provide a hitch for towing on land. From D-Day to D plus 60 approximately 2400 skid loads of medical supplies were prepared in United Kingdom depots and shipped to the Continent. [2]

19. Disadvantages of Skid Loading of Medical Supplies. There were certain disadvantages to skid loading of medical supplies, as follows:

a. It was necessary to have a crane to handle the skids. This caused particular difficulty on the Continent since field medical depots were not authorized a crane by tables or organization and equipment.

b. Supplies were tied up in dead storage for considerable lengths of time because of the reluctance on the part of depot personnel to break open a skid containing many items in order to secure one item that was needed.

c. The loss of packing lists from skids made it impossible to determine what was contained in a particular skid without breaking it open. It was the consensus of opinion following several months experience on the Continent that, if used for medical supplies, skids should only be used under the following conditions: Measurement, about 32 inches by 40 inches; total weight including supplies, between 600 and 800 pounds; not more than three or four different items in any one skid; contents and quantities stenciled on the outside of the skid in large letters. It was the opinion of many that bulk shipment of maintenance medical supplies would have been more practicable. [2]

20. Conclusions and Recommendations. It is the conclusion and recommendation of the General Board that the hinged, amphibious box is very suitable for packing unit medical equipment of tactical hospitals and should be authorized by tables of organization and equipment for such organizations. It is further recommended that in future operations maintenance medical supply stocks be shipped in bulk, with ample provision being made for tarps and dunnage. If skids are to be used, a smaller skid, packed and marked as indicated in the previous paragraph, should be used.

CHAPTER 4

REQUISITIONING AND STOCK CONTROL PROCEDURES

21. Establishment of a Central Stock Control System. It is generally agreed that an adequate central stock control system based on modern merchandising procedures is an essential aspect of a major supply service of a theater of operations. It was not until February, 1944, however, that such a system was established in the Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, upon recommendation of the Voorhees Committee. [1] The stock control procedures which were developed subsequent to the Voorhees Committee investigation are discussed below. These procedures were established over a period of months following the reorganization of the Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, in February, 1944, and were in effect at the cessation of hostilities. [4]

22. Computation of Theater Requirements. A 60-days' level of medical supplies was authorized for the European Theater of Operations, but in order to allow for order and shipping time (120 days), a requisitioning objective of 180-days' supply was established for each item stocked in the theater. The requisitioning objective of each item was computed by using the War Department replacement factor, expressed in terms of units of the item authorized per 1000 troops per month in combination with the estimated average monthly troop strength for the succeeding six months, multiplied by six. Where War Department replacement factors proved inaccurate, factors developed in the theater were used. Replacement factors were constantly reviewed in the light of issue experience and recommendations for changes made to the War Department where indicated.

23. Procedure for Requisitioning from the Zone of the Interior. Until 1 April 1945, replenishment of medical stocks from the Zone of the Interior was effected by placing normal maintenance requisitions on the New York Port of Embarkation twice a month. The requisition for Classes One through Four in the Medical Supply Catalog was forwarded on the first of the month and the requisition for Classes Five through Nine on the 15th of the month. In addition to these normal periodic requisitions, numerous other requisitions, such as requisitions for teeth, optical supplies, biologicals, spare parts and emergency requirements were also submitted. After 1 April 1945, in accordance with G-4 (Communications Zone) Memorandum No. 3, dated 26 March 1945, Subject: "Procedure for Requisitioning on New York Port of Embarkation", all services began submitting monthly requisitions. In this way, theater stocks were routinely replenished based on stocks consumed during a previous 30-days' period.

24. Stock Levels in Communications Zone Medical Depots. The European Theater authorized level of medical supply was prorated to all Communications Zone filler depots based on the percentage of total troops served by the individual depot. Thus if a depot served ten per cent of the troops in the theater, the authorized level of supply for that depot would be ten per cent of the theater level. Depot stock levels

were maintained in two ways, by distribution of stocks from the United States at Ports of Embarkation, or by transfer between depots. 2,4

25. Stock Reporting. Prior to February, 1944, depots in the United Kingdom were making a monthly stock report to the Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, but the latter lacked an adequate staff and system to prepare a comprehensive consolidated stock report. This monthly report was supplemented by a weekly report of a list of items which were in critical short supply, and for a time also by a daily report of items which had become exhausted in depot stocks. All these reports together, however, did not give to the Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, dependable and sufficiently up-to-date information as to depot stocks. It was evident that no balancing of stocks in the depots could be effected without a complete change in the reporting system. Upon recommendation of the Voorhees Committee, the three types of above-stated reports were discontinued and a new system of reporting was devised whereby depots made a complete stock report every 15 days. Such reports formed the basis for a consolidated stock report prepared in the Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, showing quantities of items on hand by depot, and back orders. The adoption of this reporting system facilitated preparation of theater requisitions and distribution of incoming stocks. It eventually brought about a balancing of depot stocks which greatly improved medical supply service to troops and installations in the United Kingdom and made adequate medical supply support of subsequent operations possible. 1,2,4

26. Control of Critical Items. In order to prevent too wide a dispersion of stocks of critical items a key depot system was established in the United Kingdom in March, 1944. Under this system key depots were given the highest priority on the distribution of stock. Stock levels in key depots were satisfied up to 100 per cent of level before distribution was made to non-key depots. Non-key depots, when out of stock on an item, extracted to the key depot stocking the item. On the Continent, Depot M-407, Paris, France, was established as a key depot for all items which were to be stocked only in one depot. This not only included critical items of medical supplies and equipment, but also teeth and facings, books and blank forms, medical spare parts, and optical supplies. All Communications Zone filler depots on the Continent extracted requisitions for such items to Depot M-407. 1,2,4

27. Conclusion. It is the conclusion of the General Board that the success of the European Theater medical supply service in supporting continental operations was due in a large measure to the requisitioning and stock control procedures described in this chapter.

28. Recommendation. It is recommended that similar techniques be adopted in future operations.

CHAPTER 5

WHOLE BLOOD SERVICE

29. Importance of Whole Blood in the Care of Wounded. It is generally agreed that one of the major therapeutic contributions to the care of the wounded soldier in this war was the provision of refrigerated whole blood. Whole blood was a most important factor in saving an incalculable number of lives. The system, successfully employed, for the rendition of this service is described in the following paragraphs.

30. Organization of the European Theater of Operations Whole Blood Service. The European Theater of Operations whole blood service consisted of two base blood banks, one in Salisbury, England, and one in Paris, France, four advance blood banks, Communications Zone type, and four advance blood banks, Army type. Collection and processing

of blood was accomplished by the base blood banks; distribution to hospitals in the forward areas was accomplished by the advance blood banks. The base bank in Paris played the most important role in the distribution system since all blood passed through it for delivery to the advance banks on the Continent. Advance banks operated in pairs, one Communications Zone type unit and one Army type unit in support of each field army engaged in active operations. The advance bank, Communications Zone type, in addition to furnishing blood to Advance Section, Communications Zone hospitals, also supplied the army bank. 5,6

31. Organization of Base Blood Banks. The two base blood banks were provisional organizations operated by the 127 and 152 Station Hospitals. Each was composed of a base section and three mobile bleeding teams. Inasmuch as some of the personnel of these hospitals were engaged in other functions it is impossible to give an exact organizational picture of the base section. An average of two officers and approximately 40 enlisted men were actually engaged in the base section function of processing and storing of whole blood. Each bleeding team consisted of one officer and seven enlisted men. 5

32. Organization of Advance Blood Banks. Each advance blood bank, Communications Zone type, consisted of one officer and 15 enlisted men, including a commanding officer, Captain or Lieutenant, Medical Administrative Corps, one Staff Sergeant, one refrigerator mechanic, ten drivers, two motorcyclists and one clerk. Advance blood banks, Army type, except for having five additional drivers, were similarly organized. 6

33. Base Blood Bank Operations. Base blood bank operations may be segregated under two headings, the collection of blood from donors performed by bleeding teams, and the processing and storing of blood performed by the base section. The bleeding teams operated out of the base section visiting troop concentrations where bleeding was accomplished. Bottles of blood were placed immediately in Quartermaster food containers and iced. Each evening a truck from the base section arrived at a prearranged meeting place to pick up the blood drawn during the day, and at the same time brought sterile donor sets and bottles. At the base section the blood was stored in a refrigerator pending serological tests.

34. Distribution of Whole Blood on the Continent. The whole blood stored and distributed by the Paris base blood bank was procured from three sources: From the United States, from the base blood bank in the United Kingdom, and from a pool of donors in the Paris area. Based on estimated demands, blood was packed in ice in Quartermaster food containers and shipped by plane or truck to advance blood banks located in the Advance Section, Communications Zone. Refrigerated trucks were dispatched daily from these banks to deliver bulk shipments to the army blood banks. Individual refrigerated trucks made scheduled runs from army blood banks to field and evacuation hospitals. 5,6

35. Determining Requirements of Whole Blood for Continental Operations. In planning whole blood requirements for operation "OVERLORD" there were no experience tables upon which to base calculations. From what British statistics were available it appeared that one pint of blood for every ten wounded represented an adequate supply. A short time prior to the landings in Normandy information received from the United States Army in Italy and from the British in Africa cast grave doubts on the adequacy of this planning. Recalculation resulted in a change to one pint of blood for each five estimated wounded. It was on that basis that the European Theater of Operations Blood Bank began operation. Soon after the invasion it became evident that this planning was also in error and that the amount of blood needed was considerably greater than had been anticipated. There ensued a period of hand-to-mouth activity when the

charts of planned production were discarded and the activity of the blood bank was increased to collect and ship to the continent all blood possible. A review of the ratio of blood to wounded in the various armies throughout continental operations is set forth below. It should be noted that except in the First United States Army, all armies consumed approximately one pint of blood for each wounded admission. 7

	Ratio of Blood to Wounded Admissions		
	Pints of Blood		Number of Wounded Admissions
First Army	1	:	2.1
Third Army	1	:	1.2
Seventh Army	1.4	:	1
Ninth Army	1	:	1

36. Conclusion. It is the conclusion of the General Board that the provisional organization for the supply of whole blood in the European Theater of Operations was eminently successful.

37. Recommendations. It is recommended that for future operations a table of organization and equipment be authorized for an organization similar to the provisional base blood bank for the purpose of collecting and processing whole blood. There is no justification, however, for the distribution of whole blood through other than normal medical supply channels. It is recommended, therefore, that whole blood be handled by medical depots operating in the forward Communications Zone areas and the armies, and that the type of personnel and equipment employed in the European Theater by advance blood banks be incorporated in the table of organization and equipment of the Medical Depot Company. With regard to requirements it is recommended that a ratio of one pint of blood for each anticipated wounded admission be used for planning purposes.

CHAPTER 6

MAINTENANCE AND REPAIR OF MEDICAL EQUIPMENT

38. Importance of Maintenance and Repair of Medical Equipment. The difficulties encountered by medical units in obtaining replacement of medical equipment during continental operations served to emphasize the importance of proper maintenance and repair of medical equipment. Since this medical supply function took place at all levels in the European Theater this chapter has accordingly been placed under the discussion of the theater medical supply service.

39. First and Second Echelon Maintenance. By far the greatest source of difficulty experienced by medical units in the European Theater of Operations with regard to maintenance was the Coleman burner. To avoid excessive unserviceability due to the use of leaded gasoline, most armies made arrangements for medical units to draw white gasoline. Even with the use of non-leaded gasoline, only by constant daily maintenance were burners kept in operation. Units with major items of medical equipment, such as field and evacuation hospitals, found it desirable to detail an enlisted man to supervise medical equipment maintenance. Many hospital commanders believed that unserviceability of medical equipment would have been reduced appreciably had a qualified medical equipment maintenance technician been authorized by tables of organization and equipment.

40. Third Echelon Maintenance. Third echelon repair of medical equipment was performed by army base medical depots in all armies. Since Table of Organization and Table of Equipment 8-661, dated 2 April 1943, under which all army medical depot companies in the European Theater were organized, does not authorize adequate repair

personnel and equipment, most depot companies requested and obtained authority to retain the repair personnel and equipment authorized under Table of Organization and Equipment 8-667, dated 17 April 1944. In so doing they were able to provide adequate third echelon repair service for army medical units. The principal difficulty encountered at this level of repair was a constant shortage of spare parts.[3,8]

41. Fourth and Fifth Echelon Maintenance of Medical Equipment. At the cessation of hostilities practically all Communications Zone medical depots were operating third and fourth echelon repair sections. The backbone of the medical equipment repair system in the European Theater of Operations, however, was the Medical Repair Shop at Depot M-407 in Paris, where major fourth and fifth echelon repair of medical equipment in the theater was accomplished. It was in addition the key depot for all medical equipment spare parts in the theater. The major problem again was one of scarcity of spare parts, the result of non-availability in the United States.[4]

42. Conclusion. It is the conclusion of the General Board that, although medical equipment maintenance and repair in the European Theater of Operations was satisfactory, it would have been more efficient had tactical hospitals been provided a medical equipment maintenance technician by tables of organization and equipment and had the supply of medical spare parts been less critical.

43. *Recommendations.* It is recommended that in future operations greater emphasis be placed on training Medical Department enlisted men in medical maintenance and repair, that the tables of organization and equipment of all tactical hospitals be amended to provide a medical equipment maintenance technician, and that to insure adequacy of stocks a more vigorous procurement program for medical spare parts be initiated in the United States in conjunction with the initial procurement of the item concerned.

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PART TWO

COMMUNICATIONS ZONE MEDICAL SUPPLY SERVICE

CHAPTER 1

MEDICAL SUPPLY OF COMMUNICATIONS ZONE UNITS AND INSTALLATIONS

44. Supply of Unit Medical Assemblies to Hospitals. A major problem confronting the Communications Zone medical supply service was that of providing unit medical assemblies to station and general hospitals. A majority of the hospitals arrived on the Continent with minimum essential equipment, their unit medical assemblies scheduled to arrive simultaneously from the United States. In actual practice this rarely happened. The failure of the Allies to capture adequate deep-water ports, with the resultant delay in unloading of ships from the United States, retarded the delivery of assemblies to units. Diversion of boats to the United Kingdom likewise hampered the prompt issue of assemblies. The practice of shipping split assemblies, that is, parts of a single assembly on several different boats, caused the Communications Zone medical supply service untold difficulty in marrying the various shipments to provide a functionally complete assembly. Following the opening of additional channel ports and the stopping of split shipments, supply of unit medical equipment to Communications Zone hospitals was accomplished with a minimum of difficulty. 1

45. Maintenance Medical Supplies to Communications Zone Units and Installations. Once Communications Zone medical depots had built up adequate balanced stocks on the Continent, the furnishing of maintenance medical supplies to Communications Zone units and installations posed no particular problem. Communications Zone station and general hospitals were authorized to maintain the 90-days' stock of expendable medical supplies which was issued initially with their unit medical assemblies. Except for emergency items, requisitions for maintenance medical supplies were submitted by such hospitals on a monthly basis. The authorization of a high level in station and general hospitals was justified inasmuch as a lower level would have necessitated more frequent requisitioning which in turn would have increased the burden on depots.

46. Conclusion. It is the conclusion of the General Board that the continental hospitalization program in the Communications Zone was retarded due to the late arrival of unit medical assemblies. While the failure to capture adequate deep-water ports was unavoidable, the split shipment of unit medical assemblies could have been prevented.

47. Recommendation. It is recommended that in future operations Ports of Embarkation be directed to avoid split shipment of unit medical assemblies.

CHAPTER 2

MEDICAL SUPPLY SUPPORT OF THE ARMIES

48. Initial Plan for Supplying the Armies. With the establishment of rear boundaries by the First and Third United States Armies and assumption of control by 12 Army Group, the Communications Zone medical supply service on the Continent commenced its primary mission

of supplying the armies. Initially, requisitions for medical supplies from each army passed through the regulating station in support of the army to Headquarters, Advance Section, Communications Zone, from where they were forwarded to designated Communications Zone medical depots. The Communications Zone was responsible for delivering the supplies to the armies. In emergencies, however, armies often by-passed channels and dispatched transportation direct to Communications Zone medical depots. [1,2,3,4]

49. Tonnage Bid System. In September, 1944, as lines of communication lengthened and available transportation became scarce, the system discussed above was replaced by the Tonnage Bid System, under provisions of Directive, Headquarters, Communications Zone, dated 5 September 1944, which established a system of Red Ball truck shipments to armies and at the same time a system of supply for the armies based upon daily requisitions and tonnage allocations. Under this system the armies and Advance Section, Communications Zone, were each allocated a certain amount of tonnage daily. Each such agency divided its daily tonnage among its various services and, based upon this tonnage, the services prepared requisitions for submission to Headquarters, Communications Zone. At a nightly meeting held at Headquarters, Communications Zone, the requisitions were distributed to the services and tonnage allocations for movement of supplies by truck from Normandy Base dumps to armies and to Advance Section, Communications Zone, were established. It was the responsibility of Normandy Base Section that the required number of trucks reported to the designated depot at the proper time to move the supplies forward in Red Ball truck convoys. This system apparently worked quite satisfactorily for bulk supplies such as rations, POL, and ammunition. It did not work well, however, for medical supplies, principally because of the difficulty in maintaining stock control records for the multitude of items under the system. Armies were constantly in a quandary as to the quantities yet due in and had difficulty in preparing requisitions. Furthermore, under the system practically all of the total available tonnage was allocated for movement of supplies to the armies and to Advance Section, Communications Zone, leaving very little tonnage to the Communications Zone medical supply service for movement of supplies from the beach dumps to the forward Communications Zone depots. [1]

50. Final Requisitioning System Adopted. By December, 1944, transportation facilities had so improved that the apportionment of tonnage among the armies was no longer necessary and a system of requisitioning was adopted whereby each army submitted requisitions for medical supplies through the regulating station in support of the army to a designated forward Communications Zone medical depot. All available tonnage, which was generally adequate, was allocated to the Communications Zone services to use as they saw fit to best supply the armies. This system remained in effect throughout the remainder of the period covered by this report. From the point of view of the Communications Zone medical supply service, it proved to be a decided improvement over the Tonnage Bid System, since it facilitated movement of supplies to forward Communications Zone medical depots where they would be readily accessible to the armies. [1,2,4]

51. Difficulties Encountered in the Movement of Supplies. The main problem confronting the Communications Zone medical supply service once the final system of requisitioning and tonnage allocation had been established was one of physical movement of supplies. This was due largely to the fact that individual shipments of medical supplies are usually small. Experience proved that whereas it was relatively easy to move trainloads of supplies and solid convoys, it was not easy to move individual car and truck loads. This was not only because it was difficult to procure the actual trucks or cars in small groups but also because individual car and truck shipments tended to become lost. Great difficulty was experienced in moving supplies over long distances by truck, particularly where the trucks were not under direct control of either the consignee or consignor. Drivers

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in many instances became lost and delivery of supplies delayed; in some cases the supplies were completely lost. Railroad cars likewise frequently were lost or misconsigned, resulting in prolonged delay in delivery of supplies. [1,2,4]

52. Expedients Adopted to Solve the Problem. The Supply Division, Office of the Chief Surgeon, European Theater of Operations, United States Army, adopted many expedients and made every effort to secure transportation necessary to get supplies where they were needed. The means included utilization of borrowed vehicles, hospital trains, and air transport. Experience during the latter part of 1944 proved that one of the most rapid and successful methods of shipping medical supplies was by hospital train. As the armies advanced into Germany, however, air shipment of medical supplies assumed paramount importance since railroads in the forward areas had been completely disrupted. To prevent shipments from becoming delayed or lost, a Supply Movement Control Section was established in the Office of the Chief Surgeon which followed and controlled medical supply shipments from point of origin to destination. [1,5]

53. Conclusion. It is the conclusion of the General Board that the Communications Zone medical supply service was, in general, very satisfactory and that the principal difficulty encountered in supplying the armies throughout continental operations was one of transportation.

54. Recommendations. It is recommended that in future operations greater effort be made by the Transportation Corps to furnish adequate truck and rail transportation to move medical supplies from rear areas to forward Communications Zone medical depots and to the armies, and that an adequate system be devised to prevent medical supply shipments, which are usually small, from being lost or misconsigned.

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PART THREE

ARMY MEDICAL SUPPLY SERVICE

CHAPTER 1

ARMY MEDICAL DEPOTS

55. Type of Army Medical Depot Company Employed in the European Theater of Operations. It is of interest that the latest type medical depot company, combat zone, as organized under Table of Organization and Equipment 8-667, dated 17 April 1944, was never employed in the European Theater of Operations. The Chief Surgeon obtained War Department authority to retain the medical depot company as organized under Table of Organization 8-661, dated 2 April 1943, for both army and Communications Zone use. All medical depot companies arriving in the European Theater were promptly reorganized into units of this type.

56. Allocation of Army Medical Depot Companies. The normal assignment of a Table of Organization 8-661 type medical depot company is one per field army. In the European Theater it was found that armies required additional sections of advance platoons as a result of lengthened lines of communication, widened boundaries, and the accumulation of large quantities of captured enemy medical supplies. It was generally agreed, nevertheless, that an average-sized field army could be provided routine medical supply service by a single medical depot company, as borne out by the experience of the First, Seventh, and Fifteenth United States Armies. [1,2,3]

57. Location of Army Base Medical Depots. The selection of a site for the army base medical depot was always governed by the following considerations: Railroad lines to Communications Zone medical depots, road net to the front and rear, and warehouse facilities. Since these features are ordinarily found only in commercial and industrial centers, army base medical depots were usually located in such communities situated centrally in the army service area. [1,9]

58. Establishment of Army Advance Medical Depots. Experience in the European Theater of Operations proved that since divisions are not capable of carrying large reserves of medical supplies they must be closely supported by army medical depots. Advance depots, stocked principally with fast-moving expendable items, were employed extensively by all armies. This was particularly true after the forces broke out of the Normandy Beachhead and raced across France. Advance depots were often 75-100 miles ahead of the army base medical depots. In spite of this there was frequent criticism from division medical supply officers that sufficiently close support was not being received. In this regard the subject of tonnage to be carried by army depots is of importance since large stocks, while providing a greater measure of safety, also hamper quick movement in support of combat troops. The experience of the First United States Army confirms this point. After the break-through in Normandy the army base medical depot lagged far behind due to inability to move large stocks (over 1000 tons) which had been built up on the beaches. In order to move it was necessary to reduce stocks by turning excesses over to Advance Section, Communications Zone. [1,4,5,6]

59. Stocking Army Medical Depots. During early operations on the Continent most armies stocked practically all available medical items in varying quantities. In many instances several items were carried in stock where one would have been sufficient. This not only produced overstockage in army medical depots, but in addition, resulted in many items being in short supply in Communications Zone

medical depots which were urgently needed by Communications Zone medical installations. To correct this situation the Chief Surgeon, European Theater of Operations, published in April, 1945, a "Catalog for Field Armies" which listed items to be stocked by armies, and items which were available in Communications Zone depots on request. Actual items to be stocked by the armies were determined by army surgeons and army medical supply officers at a conference held at Headquarters, Communications Zone, in February, 1945. A sizeable reduction in the number of items to be carried by armies was made. While it is true that hostilities ceased too soon for the catalog to be given a conclusive test, it was generally agreed that in future operations a similar catalog should be available at the onset of hostilities to serve as a guide to procurement, planning, and supply build-up. This should receive constant attention during peace time and the catalog maintained in accordance with advances in therapy and equipment. [7,8]

60. Issue Procedures and Policies. Medical depots in all armies routinely filled requisitions for expendable items immediately so that medical supplies could be taken back by the same person who brought in the requisition. One copy of a requisition usually sufficed, unless the requisitioning unit desired an edited copy for file. None of the armies used the standard system of back-ordering unfilled items; units were advised to requisition the items at a later date. The policy on issue of non-expendable medical items varied among the armies. In the Seventh United States Army the Commanding Officer of the 7 Medical Depot Company had authority to approve or disapprove all requisitions. This plan was popular among unit supply officers since it eliminated long journeys to the Army Surgeon's Office. The First, Third, Ninth, and Fifteenth United States Armies required approval by the Medical Supply Officer on the staff of the Army Surgeon on all requisitions for items in excess of authorized allowances. [1,8,9,10]

61. Conclusion. It is the conclusion of the General Board that while army medical depots in the European Theater of Operations provided reasonably satisfactory service, sufficiently close support of rapidly advancing divisions, which would have greatly alleviated the burden on division medical supply officers, was frequently lacking.

62. Recommendation. It is recommended that in future operations all possible measures be taken by army medical depots to reduce tonnage on hand to a level that will permit rapid movement without sacrificing adequacy of medical supplies carried in stock. This can be accomplished by carefully analyzing requirements and by holding to a minimum the number of items stocked. The army base depot should not carry over 300 tons of stock and advance medical depots a maximum of 75 tons.

CHAPTER 2

MEDICAL SUPPLY FUNCTIONS AT CORPS LEVEL

63. Approved War Department Doctrine. The general plan for medical supply of Corps units as outlined in paragraph 147, Field Manual 8-10, Medical Service of Field Units, calls for consolidation of all requisitions by the Corps Medical Supply Officer and distribution of supplies received from the army medical depot.

64. Actual Practice in the European Theater of Operations. In actual practice in this theater the Corps Medical Battalion in most instances operated a small medical supply point from which common, fast-moving items were issued to Corps units upon informal request, written or oral. Supplies were often delivered to the units by

ambulances which contacted each Corps unit daily or every second day. The plan proved to be a boon to small units since they were not required to prepare formal requisitions and dispatch transportation to the rear. In addition it provided an emergency reserve in fast-moving situations when army medical depots lagged behind.[4,11]

65. Conclusion. It is the conclusion of the General Board that in operating the small medical supply point, described above, the Corps Medical Battalion performed an essential service for Corps units.

66. Recommendation. It is recommended that this function be made a definite responsibility of the Corps Medical Battalion and included in publications setting forth approved War Department doctrine.

CHAPTER 3

MEDICAL SUPPLY OF THE DIVISION

67. During Landing Operations. In planning for operation "OVERLORD" division surgeons were given considerable freedom of action in planning medical supply of the division during the assault phase. In general, plans followed a pattern similar to the one adopted by the 4 Infantry Division, discussed in detail below.

a. All individual medical kits were extended, filled with additional dressings, morphine, bandages and adhesive; then waterproofed with pliefilm carbine covers.

b. All medical enlisted men carried a 60-mm mortar shell outer container, M51A1, packed with 12½ pounds of surgical dressings, drugs and blood plasma. To permit carrying in the manner of a golf-bag over one shoulder a ring of light wire was soldered on each metal end of the container and a 32-inch canvas strip with buckle was attached. A 6-inch white circle, housing a 6-inch Geneva Red Cross, was painted on each side of the container.

c. At least 13 medical enlisted men of each battalion medical section carried, in addition, an improvised "litter unit" consisting of one litter collapsed, around which had been wrapped two blankets and to one pole of which had been secured one Thomas leg splint and two wireladder or basswood splints.

d. All remaining organizational equipment and certain additional equipment authorized by the Army Surgeon and the remainder of 285 mortar shell containers, the division reserve of expendable medical supplies, were carefully loaded on vehicles phased in the battalion and regimental build-up. The success of the prior planning was evidenced by the fact that no critical shortages developed ashore, no personnel of medical units were drowned as a result of being too heavily loaded, and loss of equipment and supplies was negligible. The 285 mortar shell containers were assembled near beach exits by contact agents of the three division collecting companies and carried forward as requested by returning litter bearers. This reserve considerably alleviated the immediate supply problem until army medical supply dumps could be established.[1,12]

68. During Normal Operations. The approved War Department doctrine governing the medical supply of divisions in combat, namely, the informal flow of medical supplies forward through evacuation channels, was followed in the European Theater of Operations. Battalion aid stations were supplied from small reserve stocks carried in collecting stations. Normally a note sent back with ambulance or jeep drivers evacuating casualties from the aid station served as a

requisition. Supplies were forwarded on the return trip. Collecting stations replenished stocks by requisitioning informally from the division medical supply dump. Supplies were usually wrapped in a blanket, tagged for the intended unit and placed on ambulances returning from the clearing station. Aid stations of field artillery battalions and other divisional units drew supplies informally direct from the division medical supply dump, which was ordinarily established in the neighborhood of the division clearing station. [5,13]

69. Medical Supply of Armored Divisions. Medical supply of armored divisions was accomplished in essentially the same manner as infantry divisions, except that the division reserve normally was divided equally among the three medical companies (carried in the clearing station of each) with an additional reserve being carried by division medical supply. [14]

70. Medical Supply of Airborne Divisions. Medical supply of airborne troops operating ahead of ground troops was accomplished by dropping A-5 aerial containers. During operations in Normandy the recovery of these containers was in most instances only a small fraction of those dropped, due in a large measure to dropping during hours of darkness. In subsequent airborne operations, however, all classes of supplies including medical supplies were dropped during daylight hours. Recovery of containers in these operations was very efficient and losses kept to a minimum. [15]

71. Conclusions. It is the conclusion of the General Board that medical supply for the assault divisions during landing operations was successfully planned and executed; that the procedures employed within the divisions during subsequent continental operations demonstrated the validity of approved War Department doctrine governing medical supply of the division during normal operations; and that medical supply of airborne troops operating ahead of ground troops is more efficient when accomplished during daylight hours.

72. Recommendations. It is recommended that in future operations a plan similar to the one described above be adopted for the medical supply of the assault divisions during landing operations; that no changes be made in approved War Department doctrine governing medical supply of the division during normal operations; and that if combat conditions permit A-5 aerial containers marked with conspicuous red crosses be dropped only during daylight hours.

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