MILITARY HOSPITALS—CHOICE OF SITE AND DESIGN.

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The threat of extensive aerial bombing of towns and cities is one of the more important of the new tactical considerations involved in this war. It is apparent that it affects the activities of all communities, civil, industrial, military, etc., within the theatre of war, but it is not perhaps so apparent how it particularly affects the Army Medical Service in the matter of hospital accommodation. In the last war, where the number of civilian casualties at bases some distance from the actual fighting and at home (England) was negligible, many military hospitals (general, special, convalescent, etc.) were conveniently set up in civil hospitals, schools, and other similar large buildings already standing in those areas and already equipped with water, electric power, and so on. Naturally buildings of this description normally stand within the boundaries of fair-sized civil communities (towns and cities). In the present war where, as is cautiously anticipated, one thousand or fifty thousand casualties may suddenly occur in any large town or city and require immediate attention, it is obvious that these central hospitals or potential hospitals must be kept available for civilians. In other words, these cannot be used, or even kept in reserve as military hospitals; others must be found or built.

When a hospital is projected in a certain region a medical officer (generally of fairly senior rank) will be one of the first persons from whom an opinion and recommendations are required, and it is the purpose of this communication to represent some of the considerations on which such an opinion and recommendations might be based.

Without entering into too great length and detail, the following would appear to be the main general considerations for the construction of a military hospital under current conditions:—

1) Strategic and Tactical Considerations.—These of course, are the prime consideration and are entirely the concern of the War Office (or G.H.Q. abroad). By them it is decided whether there is to be a hospital at all and in what region.

2) Decentralization.—Spacing is the best protection from air attack. It is as well to remember the massing of headquarters, hospitals, stores, etc., in places like Etaples in the last war which invited and duly received a certain amount of devastation; this war the possibilities of devastation are greater. Decentralization means amongst other things inconspicuousness and elusiveness of target, and in this connexion a degree of isolation of the hospital will be striven for not only from large towns but from other large concentrations of buildings or troops. It is not by any
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means certain that display of a red cross will protect hospitals from attack; in any case from great height these distinguishing marks are difficult to see.

(3) Accessibility.—It is obvious that if a hospital is to do its job in receiving convoys of sick and wounded, in treating them, and in evacuating them as quickly as possible, either back to the firing line or home, it must be served by good roads and not be too far distant from other established means of communication, i.e. railways, canals, rivers, or ports. A balance must be struck between decentralization and accessibility.

(4) Practicability.—Under this will come practicability for building, i.e. availability of materials, water supply, power, etc.—the hospital may either have to be entirely built, or largely built as an addition to an existing building—and practicability for use as a hospital, i.e. healthiness of site, drainage facilities, etc.

These matters are more the concern of the R.E., but must be borne in mind by the medical authority.

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(A) Abroad.—The above general considerations will apply, but the varying conditions encountered in theatres of war abroad, type of country, type of inhabitants, type of warfare, whether mobile or comparatively stationary, will introduce many special considerations. Thus in a theatre of war, for instance, base hospitals might be built very similar in conception to hospitals in England, but in other theatres, permanent constructions might not be built at all, and reliance placed on hospital ships or hospital trains. In all theatres of war abroad, however, this special rule will hold:

General hospitals where wounded and serious cases are dealt with (this is intended to exclude such special hospitals as neurological) should never be so close to the seat of fighting as to be in danger of disorganization by gunfire or indiscriminate air raids on the forward lines of communication, or so distant as to cause undue delay primarily in treatment and secondly in returning cured casualties to the front.

(B) At Home (Great Britain).—Military hospitals in Great Britain during war serve: (i) Units on active service in Great Britain, (ii) units training—at scattered points all over Great Britain, (iii) casualties transferred from a theatre of war.

The situation of such hospitals will be chosen according to the simple principles of common sense, i.e. where the concentration of troops demands them. Economy will be served by having in a certain area a large hospital centrally situated (e.g. in the centre of a triangle at whose points, thirty miles apart, three separate units are training) rather than a multiplicity of smaller hospitals. Where military hospitals are already in existence in cities or large towns, which are otherwise well catered for as regards hospital accommodation for civilian casualties, no doubt these hospitals should continue to function rather than be left vacant; but in all other cases where
a new military hospital is to be established, the aforementioned general considerations, particularly decentralization, will apply.

**CHOICE OF DESIGN.**

These remarks apply both at home and abroad, for after all the object of hospitals, curing the sick, does not differ all over the world, and generally the methods do not vary overmuch either; therefore, if an efficient design for a hospital of specific size and nature (say a general hospital of 600 beds) can be decided upon for one region, it should prove effective, with minor variations due to climate, etc., for other regions as well. It will be realized that in these remarks I am only referring to military hospitals with particular reference to the emergency situation of a time of war. I have already said that in some cases hospital ships or hospital trains will take the place of ordinary immobile or permanent units. Again, special hospitals of every kind require special divergencies from normal considerations, therefore in discussing the matter of design, to save the time and looseness involved in attempting in a short article to deal with all exceptions, I propose to deal with the explicit instance of a general hospital of 600 beds.

This will be the procedure: The War Office or G.H.Q. will decide that a general hospital for 600 beds will be built in a certain region. A staff officer, possibly accompanied by an officer of the Royal Engineers, will inspect the region and, bearing in mind the general considerations of suitability mentioned above, will select several sites on which specialists will then be asked to report. The strategy or tactics of the campaign may demand that the region inspected be circumscribed, a wilderness, a deserted shore, built over, or otherwise incompletely suitable; nevertheless a site must be selected. On the other hand, and generally, the region indicated will offer fair choice, and a number of sites will be selected under two headings: (A) An existing building, (B) a bare site.

(A) *Existing Buildings.*

In the specified region there may be one or a number of large buildings; for example, hotels or country houses. The staff officer knows that if a hospital is required it is in all probability required to function as soon as possible. He says to himself here is a ready-made building fairly near a railway, which is already served by water, electric power, and reasonable roads; surely with a few adjustments this can be made to serve as the nucleus of a military hospital in a very short space of time indeed. All this is quite true so far as it goes; after perhaps only moderate constructional adjustments a certain number of medical officers, nurses, and supplies could be moved in and a limited number of patients could be attended in it quite quickly, but if it is intended to visualize this place from the start as a fully equipped and fully functioning military hospital of 600 beds, there are a number of other considerations which must be immediately reviewed.
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(1) Costs.—(a) Constructional adjustments of major or minor extent will always be necessary in converting any building into a hospital no matter what its final size. For a hospital which is to house 600 patients with operating theatre, X-ray plant, cooking arrangements, etc., this constructional adjustment will almost certainly be of major extent. This is Cost 1.

(b) Additional Buildings.—The personnel alone of a 600-bed hospital is fairly considerable, and this requires to be housed and fed in addition to the 600 patients. Also it must not be forgotten that accommodation must be found for the various special departments which may in time have considerable out-patient attendance (dentist, E.N.T. and eyes), as well as for the several hospital stores of large bulk (linen, medical, steward, and pack store). Windsor Castle might have sufficient space for all this without additional building, but practically speaking, it is safe to say that additional building of some extent will in every case be required—and generally of large extent. This is Cost 2.

Costs 1 and 2 plus the cost of hire or purchase of the original building are compared with estimated costs of a hospital entirely built de novo.

(2) Time.—Estimated time of completing or partially completing a hospital built on an existing-building nucleus is compared with estimated time of building a hospital de novo.

(3) Efficiency.—The estimated efficiency of a hospital built on an existing building nucleus is compared with the efficiency of a hospital built entirely ad hoc.

After the staff officer, therefore, has submitted several possible sites for a hospital, specialists will be asked to report on them, and the first of these will be a medical officer, if possible the officer who is to have charge of the hospital when built. His report will consist of (1) a statement of the building, surroundings, and position, as to suitability of site; (2) a statement of (a) the estimated accommodation and adaptability of the building and (b) the constructional adjustments and additions required; (3) he may or may not include an opinion as to the estimated efficiency of the hospital when completed and compare it with an alternative which he may present.

In some cases a practical or professional consideration, not appreciated by the staff officer, may present itself to the medical officer (e.g. all staircases may be too small for a stretcher carrying a lying case), which rules out the building for a hospital altogether. This will be stated.

This report will be quickly inspected with an eye on the two considerations, cost and time, and if the project still seems reasonable other specialists R.E., Q, etc., are asked for reports. Their reports deal with the feasibility of the required alterations, and the estimated cost and time, and on receipt of these reports action is taken either discarding the project or proceeding with it immediately.

It will be seen that in submitting his report, the medical officer has in effect submitted his design for the completed hospital, for in his requirements for alterations and additions he must make provision for all departments of
the hospital as well as future expansions. Therefore, it is as well that at the time of making his preliminary inspection, he should be in clear possession of all that a general hospital of this size means. Unfortunately a comprehensive statement of all these requirements is not easy to obtain and he must rely upon his experience. Attached to the diagram which accompanies this article will be found a list of departments which is broadly comprehensive.

(B) A Bare Site.

I think there can be little dispute that a hospital built *ad hoc* must be more efficient than any makeshift, no matter how scientifically elaborated. Therefore, if the decision were left to the medical officer to make choice between the two alternatives discussed here: (a) An existing building, (b) a bare site, there is no question that in a hundred cases to one he would select the latter. He would know that war hospitals such as are under consideration would in all probability not be built of permanent material but of wood or canvas; however, with central heating of huts such as is now general and good planning of buildings, there is never any objection to the former in any climate or weather; and as regards tents, if these are only used in summer or in hot climates, there is no objection to them either. Nevertheless vital considerations of cost, time, and even availability of materials (such as timber for huts) must often override the matter of comparative efficiency. If not, an entirely new hospital will be built.

In planning it, any ideas of imitating a modern civil hospital, of which scores of splendid scientific models are seen going up every year, must be put completely out of mind, for the following are some of the considerations which make the two cases quite different:—

(1) Temporary materials; there will be no multiplicity of stories, elevators, etc.

(2) Likelihood of devastation by high explosives, etc.; a scientific balance of spacing and accessibility is again the rule.

(3) Provision for unlimited expansion.

(4) Provision for the accommodation and feeding of the company apart from the hospital itself.

I submit a suggested plan for a military hospital of 600 beds.

The plan is almost self-explanatory.

A space of open ground is understood to have been chosen which meets the general considerations: strategy, decentralization, accessibility, practicability.

The aspect of the hospital is southerly, and the wards are built in echelon obliquely to this direction with future extensions at right angles to each unit forming a herringbone pattern. By this arrangement the wards catch the maximum of sun but, more important, they are spaced with a kind of regular irregularity, so that not only is the destructiveness of a bomb or shell explosion minimized—a low-flying aeroplane with a machine gun which had mistaken the nature of the construction would do less damage in a
GENERAL HOSPITAL FOR 600 BEDS

PRELIMINARY SITE PLAN

SCALE OF ONE : ONE THOUSAND OR THEREABOUTS
straight line in any direction. It will be seen that spacing is the keynote of
the plan, but accessibility is well served in that the essential community
arrangements such as dining halls, kitchens, stores, etc., lie in the centre.

In front a one-way drive will conduct ambulances or inquiries past the
guard hut to the receiving room; this also is the evacuating room, and so
the drive conducts vehicles or foot passengers out again. At the guard-hut
inquiries are made and directions obtained. The C.O.'s office, registrar's
office, and hospital office are nearby. The receiving room leads readily to a
resuscitation ward and immediately contiguous, centrally, are the operating
theatres. The X-ray department is also conveniently in this block and it
is considered that hereabouts also is the most suitable place for the depart­
ments of the otologist and dentist, who will frequently require X-ray and
anaesthetic assistance. Further back, centrally, is the dispensary and
pack store. Next the hospital dining hall with kitchen attached. Next
the N.A.A.F.I. and recreation section, which is used both by hospital and
company.

Next behind come the hospital stores with the quartermaster's office
supervising. In the plan a service roadway is made in the rear of the wards
which conveniently divides the hospital proper from the company section.
All the stores of both hospital and company abut on to the roadway for the
convenience of supply trucks, etc. Beyond the roadway are grouped the
company arrangements, and on each flank is grouped an officers' block, one
for medical officers, the other for nursing sisters.

If the site allocated is not sufficient in depth, the last-mentioned group
of buildings—stores and company—could, with little loss of efficiency, be
placed on the other side of the main road in front of the hospital.

The wards as shown in this plan are of groups of two in series of 50 beds
each; thus there are 600 beds in the original plan, but the suggestion as to
size of wards is not hard and fast. The wards' various annexes may be seen.

Provision is made for other rooms which experience will show to be
desirable: a board room (for medical boards, courts of inquiry, etc.);
offices for matron, for officers in charge of medical and surgical divisions;
room for orderly medical officer. The pathologist's laboratory, which
medical officers will often visit to see their own specimens personally, is
situated somewhat centrally; the mortuary, autopsy room, and animal
laboratory is hygienically removed from the centre but convenient for
the pathologist and the road.

The plan does not purport to be drawn carefully to scale, its main purpose
being that of a diagrammatic reference (which does not appear to exist
already) for the ready consultation and guidance of officers—medical officers
in particular—who may be called upon for an opinion or recommendation in
the construction of a military hospital.