THE EVACUATION OF SICK AND WOUNDED BY AIR. 1

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(1) HISTORY.

Air Ambulance carriage has been used with success by various countries both in peace and war.

In England, since the War, it has not yet been used on a large scale owing to hospitals being somewhat easily accessible, but when aerodromes are available in outlying districts this method will obviously come more into use. In our Air Force we use it where flying stations are situated at long distances from our hospitals, or where we consider air carriage is preferable to other means.

In the East we use it as the means of evacuation. In Iraq since 1923 it has been the regular method, and it is the only means of rapid transfer in that type of country. It has proved extremely valuable in war operations, both in the desert and in the hills.

In England it was not until the year 1919 that we turned our attention seriously to this type of transport for casualties.

I can find no history of the regular employment of air ambulance by Great Britain in the Great War.

(2) TYPES OF AIRCRAFT CAPABLE OF AMBULANCE CARRIAGE.

Before we consider the carriage of casualties by air we must know our requirements, and what type of aircraft is suitable, as, owing to designs of aircraft differing, some types are not suitable.

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Requirements.—We can definitely say all aircraft for such transport must be capable of taking a case lying down, and that is to accommodate a stretcher and fittings for securing the stretcher. It must also have an opening so that a patient can be placed within while in the lying position.

Types of Aircraft suitable for carriage of Casualties.

These are:—
(1) Aeroplanes of the various types, including Seaplanes and Flying Boats.
(2) Airships.

In this paper it is only proposed to deal with the former; these are divided into the larger and smaller types.

Larger Types.—Those with a large and roomy fuselage, or a large hulled flying boat. They must have an opening whereby lying cases can be placed inside; this opening can be by a side door or an opening in the nose of the aircraft. It is better to have a side opening as handling is easier, but when it is undesirable in certain types, such as flying boats, to interfere with the hull, cases can easily be lifted over the side.

Smaller Type.—Those of the two-seater type, and which are capable of using landing grounds which are unsuitable for the larger aircraft. These usually are incapable of accommodating a lying case owing to the cross bracing wires of the fuselage, and it is not possible to alter this, as the bracing wires are an important part of their design. Aircraft of this type capable of taking a stretcher can be so designed that there are no cross bracing wires. This is brought about by using the system of hoops. Such types of aircraft, built by a British firm to accommodate a stretcher, are already in use; the means of entry is by removal of the cowling on the upper surface of the fuselage. A stretcher is then easily lowered in, and the cowling replaced. We have such a machine in the Fairey III F.

Carriage outside the Fuselage.—You can, by means of a special stretcher of the Neill Robertson type, strap a patient to the upper surface of the fuselage. This method can only be used in emergencies, and when other means are not available.

(3) Uses and Limitations of Aircraft.

The transfer of casualties by air is the quickest and most comfortable method. It is particularly valuable where military operations are at a distance from the Base, and in countries where transport by road, rail or water is difficult, or almost impossible, without a great deal of organization on the route.

The Great War has shown us the importance of early surgical treatment of those grave wounds of the abdomen, head and chest, and we know that unless such treatment can be given within six to eight hours the chances of saving life are proportionally decreased. Land transport is often slow and cannot be depended upon; therefore, it is in the interest of
life that we should use the air. Experience has shown us that all types of cases can be taken by air, and obtain benefit by the skilled treatment they can receive in a well-equipped hospital. By use of the air central hospitals will in the future be able to deal with patients from wide areas, and this will be a distinct saving in hospitals and staff.

Limitations.—These, in regard to removal of casualties, are few, and can be put down as:—(1) Weather conditions; (2) Landing Grounds.

(1) Weather Conditions.—Gales of wind which might cause the patient too much discomfort, and fog or sand storms; the latter also delay road transport. You can afford to wait when using the air, as your means are quick, and weather reports will help you.

(2) Landing Grounds.—It is essential there should be landing grounds reasonably near to your hospitals, and it must be known for what type of aircraft your aerodrome is suitable; the larger machines require a bigger aerodrome, and, therefore, you cannot expect these to use an aerodrome only suitable for the smaller type.

You must, therefore, site your hospitals reasonably accessible to a landing ground or preferably to an established aerodrome. Landing grounds may be temporarily unfit for use owing to heavy rains, but usually not for long, at any rate for the smaller type of aeroplane.

(4) The Flying Ambulance.

Under this heading we must include all aeroplanes that are capable of accommodating a lying case, and we should call them "Ambulance Carriers."

The most convenient type of air ambulance should be capable of carrying two or four lying cases and one hospital attendant. We don't want to carry a medical officer; he can do no more in the air than a well-trained medical orderly. The orderly should form one of the crew and be responsible for the necessary medical equipment.

Fittings in the Ambulance Aeroplane.—Should consist of: Stretcher fittings, and with means of securing the stretcher. Seats of collapsible type for sitting cases and for an attendant. Small water tank.

A small cabinet or box for dressings or first-aid equipment. A latrine is not necessary, but a metal funnel let in the floor is most useful for emptying excretions.

(5) Equipment Carried.

Stretchers.—The choice of these is at present limited by the agreement between the Navy, Army and Air Force to employ only a common standard type of stretcher. This has many advantages, but I foresee, however, that the stretcher of the future for air work will be a light metal stretcher which will be adjustable to fit all forms of ambulance transport.

Straps for securing the patient must be fitted to the stretcher.

Blankets.—Two for each stretcher.
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Pillows.—One for each stretcher.

Hot Water Bottle, Urinal, Bed Pan and Drinking Vessels of Feeder Type.—All these utensils should be of a light metal.

Suspension Bars for Thigh Splints.—In Iraq we found that the Suspension Bar for Thomas' Splint was too high, and therefore a smaller type was brought into use.

(6) Administration, Control and Supply.

Air carriage of casualties in warfare can only be satisfactory provided suitable aircraft are definitely available for this work, and under the direct control of those responsible for the removal of casualties. Aircraft designed and fitted for war purpose, even though convertible for use as ambulance carriers and used as such in peace time, are not specially suitable for this purpose in war, and, moreover, are unlikely to be available for ambulance work on the outbreak of war.

On the outbreak of war, therefore, we should certainly have to construct ambulance machines, and until they were ready we should have to rely on casual sources of supply such as troop carriers and heavy transport aircraft when not employed on air operations.

(7) Pilots and Crews.

These must be supplied from somewhere. We could not rely on many service pilots, but with the great increase in civil flying there should be ample supply of those pilots for this purpose, and later, pilots who require a rest from the stress of air warfare could be employed on this work.

(8) Employment.

This depends on the type of the war, and we must therefore divide our wars into: (1) Great War; (2) Small War; (3) Tropical War.

(1) Great War.—When large armies are in contact the areas adjacent to the front line will be continually under shell fire, and therefore employment of aircraft on ambulance work in this area will be impossible. The nearest position for such work will be somewhere out of this area, and that brings us to the vicinity of the advanced mobile hospitals.

Your landing ground should be reasonably adjacent to these mobile hospitals. A connecting light railway would be of much assistance. You could not expect to clear large numbers by air, but you could send down to your stationary or base hospitals those serious cases which crowd up your clearing hospitals, and those would include wounds of abdomen, chest and head which were received early enough to pass on for operation. Shattered thighs, after temporary repairs, could be early got away.

During quiet periods you could clear by air post-operative cases by this quick and simple means.

The base or stationary hospitals also should have an aerodrome reasonably adjacent and should be connected up by a light railway.
(2) Small War.—For this purpose we must assume a force operating from an established base, with columns moving up. It is therefore necessary to transfer casualties from the Field Ambulance to a stationary or base hospital by the quickest method. Such a force would have aircraft with them, and these would establish advanced aerodromes or advanced landing grounds. These would be utilized for ambulance aeroplanes. If the distance from the base to column was very great it would be necessary to establish an advanced hospital, as a journey over two hours by air would be inadvisable without some attention to the patient. If a waterway is available seaplanes or flying boats could be used, and form a connecting link with land planes. The main object of air carriage in such a type of warfare would be to avoid establishing advanced hospitals by moving your cases direct to your base hospitals.

The air method is also extremely valuable where the intervening country is unsafe, and further, if a force is besieged you could remove the serious cases by air provided the besieged force could defend a suitable landing ground.

Under the heading of Small War we must consider the situation where mechanized forces may be operating at long distances from any base or main force, and unless they carry their serious casualties with them, either in a mechanized field ambulance or otherwise, the only means of transfer to a hospital is by air; here air ambulances of the smaller type would be invaluable.

(3) Tropical War.—The removal of casualties in tropical warfare is always one of difficulty, and unless waterways are available it means carriage long distances through narrow bush tracts or other ground. This is a long and tedious business and subject to interference by hostile natives and even wild animals. Resting stages have to be established at numerous places. Water or suitable food may be difficult to obtain, and flies, mosquitoes and other insects are a real pest. You may have to take your wounded along with you, a heavy encumbrance to a fighting force.

There is only one way out of this and that is air transport. It is always possible to get a clearing or some suitable place for a landing ground for the smaller type.

(9) Combined Operations.

It is important there should be a clear understanding as to the responsibility for the evacuation in combined operations.

This point should be decided before the operations are undertaken, but if this is not possible it must be left to the commanders of the service to decide.

(10) Removal of Wounded to Hospital Ships.

It is assumed that the line of demarcation of the Naval and Military responsibility in the handling of wounded has been defined before landing.
The actual distance of the line of demarcation can only be decided on the spot. If wharves or jetties are available it will be the duty of the land or air forces to take their casualties to these or other settled embarking places.

(11) INLAND WATERWAYS.

Where operations are in the vicinity of estuaries and rivers and casualties can be brought down by small river craft or by aircraft capable of landing on water, the question as to whether these can go direct to hospital ships will depend on the local conditions, and to a great extent on the weather conditions. This point will have to be decided by the naval authority in regard to water craft and probably also in regard to aircraft, but it is probable the latter would land in the calm water of their selected base and transfer their casualties either to land or water craft, and therefore they would then come under whichever authority was responsible.

In regard to aircraft employed on such services, this means must be left to the Air Force control until they actually hand over their casualties to one or other of the services.

(12) PROTECTION UNDER RED CROSS.

Aircraft solely employed in ambulance work should come under the protection of the Red Cross, but a difficulty would always arise as to identification of such aircraft, both from the air and the ground.

A large Red Cross on the upper and lower surface of each plane might be seen in clear weather, but this would not be easy, especially when visibility was poor.

It seems better to paint the whole aeroplane a red colour and pick out a red cross with white edges.

At night, navigation lights and possibly special identification lights as are used by hospital ships would afford protection.

It would not be practical to restrict ambulance aircraft to any particular height or any particular route.