MEMORANDA ON ARMY GENERAL HOSPITAL ADMINISTRATION

BY VARIOUS AUTHORS

Edited by P. MITCHELL

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EDITED BY

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INTRODUCTORY

By Lieut.-Colonel P. MITCHELL, M.D., R.A.M.C. (T.F.)

A country carries on war by means of money and fit men; and the pace and staying power depend upon both. The men are enlisted to kill or disable the enemy, or to assist their fellow-soldiers to do so; and the country willingly contracts to make good any disablement. Money expended upon the disabled must come from what is available after paying for the cost of carrying on the offensive; and the sums that can be spared for this purpose may not provide what sentiment desires or the medical profession is accustomed to in peace.

The primary objects of army hospitals are to get the disabled, physically and mentally, fit to fight again; or, if this is not possible within a reasonable time, to return him to civil life at his highest possible value in the labour market, so that he may cost the public purse the less. If this can be more rapidly and effectually obtained by a relatively high scale of equipment (*e.g.*, orthopædic surgery), or a larger personnel (*e.g.*, the nursing service), it may be more economical to provide them.

Our new army soldier may be less keen to fight after having been disabled by wounds or disease; but having

once passed efficient for general service, and also learned to endure the discomforts of the field, his value, if again made physically fit for general service within, say, six months, is usually worth disablement costs.

The importance of obtaining the best possible recoveries of the disabled and in the shortest time is obvious. To obtain this, the general hospitals should have surgical and medical officers possessing the necessary experience; an efficient and sufficiently numerous nursing service; suitable surgical and medical equipment and material; and be able to provide the patients with suitable food properly cooked and served. The object of the following Memoranda is the discussion of possibilities of improvement upon the present high state of efficiency in the military general hospitals.

A soldier unfit for duty, after the first day, is admitted to hospital for subsistence, treatment, and provisional disposal. While in hospital he is still a soldier in receipt of pay, and the hospital's Administrator is responsible for him until he returns to a depot. The hospital Medical Officer has a free hand in dieting and treating him within limitations exercised by Army Council Instructions or by the orders of the senior officers of the medical service.

Besides medical officers and nurses, the personnel of a general hospital includes men or women trained as clerks, cooks, dispensers, assistants in laboratories and operation theatres, and in various store duties; and also a number of men trained to exercise discipline, and who possess a knowledge of handling and carrying the disabled. The regular army hospitals also include orderlies trained in nursing duties. Until recently these "other ranks" were all men more or less carefully

trained by lectures, examinations, and length of service, to qualify them to perform sectional duties. But many of these duties are better suited to women (*e.g.*, cooks, clerks); and in the home general hospitals the only sectional duties now justifying the presence of men are the clothing and pack stores and as stretcher-bearers; and none of these men need be of combatant fitness. Several N.C.O.'s ought to be retained for knowledge and to exercise discipline. Excluding the officers and nurses, the men and women now employed in the home general hospitals do not exceed one to eight of the number of beds. A less number would not be economical, as many recovering patients might be retained, for the benefit of their services, longer than is necessary.

In home general hospitals the cubic space or floor space allowed to each bed seldom approaches that of the civil hospital, which is commonly about 1,200 cubic feet or 100 superficial feet. In the army general hospitals at home which are temporarily established in fixed buildings, not erected as hospitals, and frequently having many wards without cross-ventilation, an allowance of only 60 superficial feet is provided for each bed. As most of the surgical cases are septic and an increasingly large proportion of severe cases accumulate in the wards, the detrimental effects of overcrowding are occasionally observed when all beds are occupied. Administrators try to avoid this by having wards with only 40 surface feet per bed for "up" cases, so as to provide 80 feet per bed in wards reserved for severe or septic cases. An excellent relief to overcrowding is in having one or more open-air shelters, provided by generous citizens, attached to each surgical ward for the more severe or septic cases. The low

surface space allowed per bed may be expedient on the plea of economy and the difficulty in quickly finding additional accommodation when casualties exceed the numbers anticipated; but, when not pressed for beds, patients should not be crowded in wards to allow other wards to be closed, so as to economize fuel and light, unless those in the wards occupied have each a minimum of 1,000 cubic feet. In hutted wards such a low surface space per bed (60 feet) would not be detrimental provided there is good cross-ventilation and a numerous nursing service.

Apart from convenience in receiving casualties, the essential points in determining a site for a general hospital to be established in huts or tentage are:—water-supply, natural drainage, a good road, freedom from breeding-places of disease-carrying insects, porous soil, and space for expansion. Within the hospital's boundaries the most important is a good roadway. The main road through the camp should pass the kitchen, stores, reception-room, and offices, and leave the camp at its " foul " side, as shown on the sketch plan. If the soil is a clay one, raised gravel paths to all the wards and annexes, stores, offices, and quarters, are necessary.

A general hospital during war should always aim at having the greatest number of unoccupied beds to meet coming casualties, and also because it is the most costly hospital formation to maintain. Immediately a patient no longer requires specialized treatment or observation, he should be passed on to less expensively staffed hospital formations. At home, treatment may be completed in a capitation auxiliary hospital, which also may possess advantages helpful to the recovering

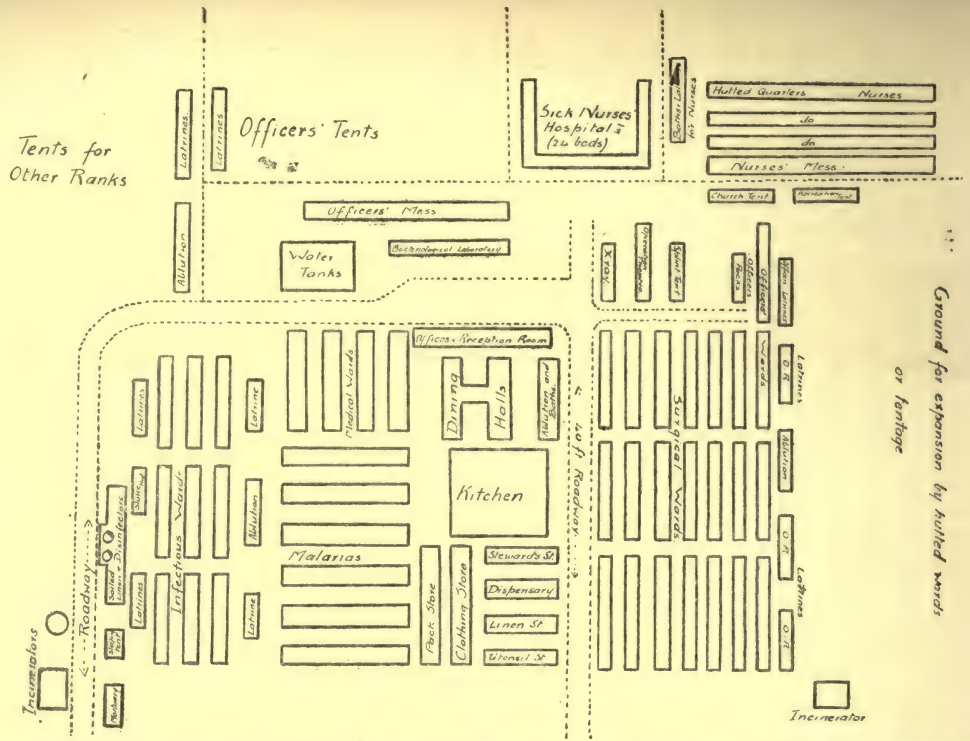


PLATE I.—HOSPITAL FOR 1,000 OTHER RANKS, 40 OFFICERS, AND 24 SICK NURSES, WITH POSSIBLE EXPANSION TO 2,000 BEDS FOR OTHER RANKS.

patient; or, if he is likely to recover his overseas fitness within, say, six weeks, he is transferred to an army convalescent hospital. In an "overseas" general hospital, when the patient is likely to return to his category fitness within a reasonable time, he is transferred to a command convalescent depot or a convalescent hospital ship. Should the duration of treatment be a prolonged one, or if on completion of treatment he is likely to be unfit for his category or other duties in the command, he is evacuated home as soon as the transfer is not prejudicial to his recovery.

The hospital is in charge of a Commanding Officer or Administrator, with a Registrar (Secretary and Adjutant), a Matron and one or more Assistant Matrons, two Quartermasters, and two Warrant Officers. The numbers of these administrative officers are quite sufficient for hospitals with beds up to 2,000 at least. Over 2,000 beds, a third Quartermaster may be necessary. Under 1,000 beds, a Registrar is not required. The number of clinical officers and members of the nursing service may vary directly with the number of patients. If there are many empty beds, and many casualties are not expected for some time, the medical and nursing personnel may be run on skeleton establishments, provided the mobilization establishments can be quickly completed when required—*e.g.*, general hospitals in France.

THE OFFICERS

By Lieut.-Colonel P. MITCHELL, M.D., R.A.M.C. (T.F.)

The ranks and numbers of officers on the "War Establishments" of a general hospital have not been adhered to, inasmuch as officers with special technical experience have been posted with their "service" ranks to duties which by that establishment entitle them to higher rank; and many of the junior members of the staff have had to be posted in emergency to other duties without being replaced. It may be convenient to discuss first the duties of officers in military hospitals, and the necessity for having a certain number of officers with special technical experience.

The **Clinical Officers** may be considered under three groups as follows:—

1. Specialists in medicine and surgery.
2. Specialists in the minor specialities.
3. Officers doing duty in wards.

1. An officer in charge of a division in a hospital of over 1,000 beds can only be in direct daily touch with a limited number of patients—*e.g.*, those on the dangerously ill list and the more seriously ill. It is necessary for him to have technically qualified assistants to keep him informed of the progress of the other cases requiring specialized treatment or observation. The assistant divisional officers on the surgical side should be able

to perform major operations; and those on the medical side with sufficient clinical experience to appreciate early symptoms and initiate appropriate treatment.

The clerical duties for which an officer in charge of a division is responsible may be prepared by the ward-masters or sisters, and completed by the Administrator, so as to liberate the clinical officers for their more important bedside duties.

During war most of the officers appointed specialists in medicine and surgery are of necessity enlisted from civil life. The fitness of these clinical officers to perform their duties seldom rests upon length of military service, but upon their experience obtained in civil practice. It follows that the first military reason in determining the rank of such an officer should be his fitness from experience to perform specialized duties, and not length of service in the army. If length of service in the army is made the reason for determining the ranks granted to clinical officers in hospital formations, one may have in the staff specialists of many years' standing junior to general practitioners or to relatively inexperienced officers who have joined the service at an early date. This principle of rank for the performance of specialized duties was admitted when the Territorial Force general hospitals staffs (*à la suite*) were formed; and, although not stated in Territorial Force Regulations, it was clearly understood then that subsequent promotions to complete the establishment would be granted to those with the experience to perform the defined specialized duties—*i.e.*, length of service would not be the first military reason for promotion. This has been unsuccessfully contended for; and had I recommended for promotion

those officers with longest service, to complete the establishment of Majors on duty, my assistant divisional officers in the surgical division would have been the radiographer, the ear and throat specialist, the dental surgeon, and a physician.

The number of these divisional and assistant divisional officers must vary with the number of patients in each division, and not on the number of beds in the hospital. Two divisional officers may efficiently undertake a hospital with beds up to 2,000 if provided with one assistant divisional officer (without beds) for every 500 patients, if the average duration of patients in hospital is not less than nine days. The establishment ranks of these clinical officers for a hospital of 1,040 beds are two Lieutenant-Colonels and four Majors. These divisional and assistant divisional officers naturally consider it unreasonable withholding from them their establishment ranks. Their incomes before temporarily joining the Royal Army Medical Corps were large compared to the pay and allowances of a Lieutenant-Colonel for an officer in charge of a division, and that of Major for a divisional assistant.

2. Specialists in the minor specialities (*e.g.*, bacteriology; radiography; eye; ear, nose, and throat; skin) are recognized by the other members of the staff because of their special technical experience. Several of them, in the regular army general hospitals only, are officially recognized, and receive the grant of additional pay of half a crown a day. Most of the overseas general hospitals should have selected officers with special experience in bacteriology, radiography, and anæsthetics. In a subtropical country bacteriology is by far the most important of the minor specialities. The

hospital laboratory requires the equipment and material considered necessary; and the number of officers and laboratory assistants, with experience, to fully undertake the work. If the specimens exceed a thousand per month a second specialist is necessary. Bacteriologists usually possess a diploma in Public Health, and one of them should also act as Medical Officer of Health for the camp and hospital. It is advisable that the hospital's laboratory officer be kept in touch with the command's central laboratory.

If the radiographer has a well-trained assistant, he may undertake considerable ward or other duties—*e.g.*, electro-therapy.

One anæsthetist of experience may be appointed when much major surgery is anticipated, but all the officers doing duty in surgical wards should share in giving anæsthetics.

Ophthalmic cases; ear, nose, and throat diseases; skin diseases; infectious diseases; jaw and orthopædic cases, are more efficiently and economically undertaken at conveniently placed centres. Few ear cases may recover general service fitness; but, as many of them have recurred due to active service conditions, a specialist is necessary for prognosis and rapid invaliding.

The work of an ophthalmic centre would consist of—

1. Cases with wounds or diseases of the eye, without other disabilities, admitted to beds allotted to the centre.

2. Ophthalmic cases, but with other disabilities; and other cases on which the physician or surgeon require an opinion.

3. All cases of refraction within the centre's area, and the issue of spectacles to the soldier.

4. Other specialized duties—*e.g.*, detecting eye malingering; testing of the colour vision; invaliding.

The number of ophthalmic surgeons, and nurses with ophthalmic training, posted to each centre, and the number of beds allotted to it, would vary with the size of the force and its expected casualties.

The spectacle centre, for the rapid issue of spectacles, with a trained optician, would naturally form a part of each ophthalmic centre.

Several centres may be formed in one command; but one should be central, and the others auxiliary to it. Such main centres would naturally form a part of conveniently situated general hospitals at the base.

3. *Officers doing Duty in Wards.*—It is desirable to have in the surgical division a number of subalterns with a love for surgery, and a like number on the medical side who have more than a leaning to recent medical research and treatment. This is necessary, as much of the surgery of war is orthopædic, requiring more than ordinary aptitude; and most of the medical cases require specialized scientific investigation.

The other officers doing duty in wards need not have special medical or surgical qualifications.

General service fitness is not necessary for duty in home hospitals, but for overseas general hospitals physical fitness to stand the discomforts of the field is necessary, and there is the possibility of officers being transferred to a field ambulance or as medical officers to regiments, when they may have to rough it. Junior officers possessing specialized clinical experience ought not to be reposted from ward duties to regiments or field medical formations where their clinical value is not exercised, simply because they happen to be young;

and if transferred on the plea of urgency, they should be returned as soon as possible.

The number of officers doing duty in wards may be taken as one to a hundred beds, which with the necessary specialists and divisional officers without beds would give an establishment of one clinical officer to fifty beds in a hospital of 1,040 beds, and in one of 2,080 beds, one to sixty-seven beds, as follows:

	1,040 *Beds.*	2,080 *Beds.*
Officers in charge of divisions - -	2	2
Assistant divisional officers - -	4	4
Officers doing duty in wards - -	11	21
Bacteriologists - - - -	2	2
Radiographer - - - -	1	1
Anæsthetist - - - -	1	1
	21	31

Administrative Officers.—If the objects of a general hospital during war are to be successfully attained, the commanding officer must be constantly on duty exercising a critical mind towards the patient's progress and his ultimate value, and his costs whether in the wards, kitchen, or stores. The Administrator should therefore be physically fit and mentally alert, and with rank higher than his senior clinical officers. One Commanding Officer might efficiently administer 2,000 or more central beds, and, if in a hospital at home, also exercise the ultimate control over the patients in his auxiliary hospital formations.

The Registrar acts as Secretary and Adjutant, and may also act as company officer. His duties are clerical and regimental, and, as a technical knowledge of medicine is not required, there is no reason why he should be a medical graduate. The duties could be

carried on by a clerical Sergeant-Major, with promotion to the rank of Honorary Lieutenant, or by one of the Quartermasters appointed Registrar and Quartermaster. In a hospital of less than 1,000 beds with two Sergeant-Majors, a Registrar is not necessary.

The duties of a Quartermaster in a general hospital are more continuous than the duties of any of the other officers. The qualifications of those recommended for a commission as a Quartermaster should not be based merely upon length of service in the N.C.O. ranks or on good conduct. A knowledge of procedure in dealing with receipts and issues saves much correspondence and is necessary; but a Quartermaster should also be one capable of exercising tactful firmness and a commercial attitude towards every source of expenditure. With over 1,000 beds two Quartermasters are necessary. The Quartermaster is the natural responsible authority for the technical fitness and accounting of the kitchen staff.

CO-ORDINATING THE CIVIL AND MILITARY MEDICAL DEMANDS DURING A PROLONGED WAR

By Lieut.-Colonel P. MITCHELL, M.D., R.A.M.C. (T.F.)

During a war necessitating the mobilization of all the forces and the formation of new armies and ratings, the civil community must needs liberate physicians and surgeons in numbers approaching one to every five hundred of the new soldiers and ratings.

Before conscription was adopted, several thousands of medical practitioners answered the army's call by accepting temporary commissions, without considering their financial loss, and leaving their civil practices to be attended to by already overburdened fellow-practitioners. Early in the war several centres—*e.g.*, Dundee, and later Aberdeen—formed Medical Bureaus whereby the civil practices of those accepting military or naval service would be carried on by their neighbouring practitioners. In Aberdeen, also, a few weeks after mobilization, a local War Emergency Committee was formed to co-ordinate the civil and military medical demands, and to conserve the interests of those accepting commissions in the army or navy. Subsequently the British Medical Association had this adopted throughout the country, but the results have been far from uniform. In Aberdeen and the North-East of Scotland the enlistments of medical men under forty-five years of age in 1916 approached 100 per cent., whereas

in other areas the percentage was relatively very low. In delaying acceptance of service, the personal reasons expressed have commonly been that friends who have accepted commissions were either performing duties mostly of a regimental or clerical nature, which might be satisfactorily performed by an intelligent R.A.M.C. orderly or medical student, or that the clinical duties allotted to them were unsuited to their experience, and of such a light nature that more medical officers were not justified until those in khaki had duties more in accordance with their experience, and occupying them as many hours as they were accustomed to in civil practice. Few medical men who have been in general practice for several years work less than eight hours a day; but a great war must always be, to the armies in the field, a series of periods of pressure and of resting; and the difficulty to be overcome is in meeting the medical needs of the former when required. Had the civil practice of medicine been an organized national service, obviously desirable during a prolonged war, this might be relatively easily met by completing skeleton establishments in the nearer fields with drafts from the home civil medical service for the periods required. Without such organizing of the profession, the civil community has to supply, and the army and navy has to maintain, establishments of temporary medical officers approaching the numbers calculated to be required for a presumed offensive. Therefore these numbers of temporary medical officers, during many months of preparation, may have more or less to mark time at depots or other centres until required, to the disappointment of these thoughtful physicians and surgeons and to the loss of the civil community.

We may here detail the probable fate of a male medical graduate of general service physical fitness who has been granted an R.A.M.C. commission for a temporary period:

1. In all general and stationary hospitals and casualty clearing-stations there are a limited number of specialists appointed; and these officers, recognized by rank or additional pay, form the clinical nucleus of their hospital.

2. Any officer may be posted to one or other of these hospital formations for surgical or medical duties, as an " officer doing duty in the wards."

3. Or he may be posted to a field ambulance, or as a medical officer to a combatant unit, or to perform administrative duties, in any of which posts he may find that his specialized technical experience is seldom required.

Practically all the medical men withdrawn from civil practice, and who have been granted temporary commissions, had the expectation that their duties would be mostly clinical; but this is not possible, as less than half of the army medical officers are performing hospital clinical duties. It is admitted that a number of these attached to non-medical units, or at depots and in field ambulances, or performing medical duties other than in a hospital formation, may possess technical experience which was of greater value to the civil community. Most officers on receiving their commissions are attached to depots or field units for training; and those with special clinical experience, not known to the authorities, may continue such training until they are drafted to one or other of the field forces, where they may receive duties to perform which do not require their special clinical experience. These officers

naturally believe that they were of greater value in civil life. The difficulty might be partly overcome if temporary medical officers were classified in categories of fitness or aptitude for specified duties. This assessing would be less satisfactorily made at depots or field units than at the general hospitals. The Administrators of general hospitals both at home and overseas could relatively determine with more ease those of most value for special clinical duties; and most of the Administrators have had lengthened experience in field units. At the end of a defined brief period of attachment to a general hospital, a return would be rendered of the officer's technical and physical fitness for the categories of duties. And those officers who are returned to partial service from disablement might also be similarly attached to general hospitals, and their value periodically assessed. An advantage to the civil community would be releasing from the home army hospitals many of the part-time or civilian practitioners by these temporarily attached, partially unfit, or newly enlisted officers.

Such procedure in early determining the value of temporary medical officers, although it would be advantageous to the army, the officers, and the civil community, is not the ideal solution. The problem of " How can the best clinical experience be placed at the disposal of the Army Medical Service with the least possible disturbance to the civil community ?" would not be solved. Until the technical fitness as well as the physical fitness of all medical men and women are ascertained, the country must accept the present civil distributions and army postings by numbers, admitted to be wasteful of valuable experience. With such a

limited body as the medical profession and most of its members attached to one society, which has local branches in touch with them individually, classification according to fitness might be readily obtained. The British Medical Association is exceptionally organized for obtaining the information required. The practical value of such a record to the country is obvious. Co-ordination of the civil and military demands during a prolonged war would be possible. Greater efficiency and economy in numbers would be expected in more fully utilizing technical experience or aptitude. Readiness in finding the most suitable officers for hospital formations would be simplified. It would be possible to conserve more fully the health and technical fitness of valuable men and women.

We may consider the more important of these advantages:

1. **Utilizing Technical Experience.** — It may be assumed—

(*a*) That no medical officer should have duties which can be performed by an N.C.O. or a non-medical officer; nor should medical duties of a commonplace nature, or of only clerical medical value, be performed by medical officers possessing valuable clinical experience—*e.g.*, M.O. i/c of Depots of Medical Stores, Registrar in a general hospital.

(*b*) That all administrative duties—*i.e.*, duties not requiring the exercise of clinical experiences—would be carried on by officers of the R.A.M.C. on the active list, and by the mobilized R.A.M.C. officers of the Territorial Force or Special Reserve or Home Reserve who do not possess special clinical experience.

(*c*) That other officers and all other graduates in

medicine and surgery would be classified by categories of both technical and physical fitness.

The following scheme would afford a basis of classification as to fitness for the needs of the services and the civil community. It might be most conveniently compiled by the local emergency committees associated with the British Medical Association. Their final teachers would provide the classification of the new graduates according to aptitude and merit in their final studies.

I. *Technical Fitness.*

(1) Degrees with dates.

(2) Technical experience—

(*a*) In general practice.

(*b*) In surgery.

(*c*) In medicine.

(*d*) In the minor specialities:—

Eye.
Nose, ear, and throat.
Bacteriology.
Radiography.
Anæsthetics.
Any other.

(*e*) In Public Health.

(3) Civil appointments:

(*a*) Hospital.

(*b*) Teaching.

(*c*) Public Health.

(*d*) Parish Council or Board of Guardians.

(*e*) Number of panel patients.

(*f*) Any other.

(4) Army or navy appointments or duties or experience, with dates.
(5) Published works, with dates.

II. *Physical Fitness.*

Age.
Present state of health.
Physical examination.

In withdrawing medical men from the civil community, those in public institutions or engaged under recent legislation have rightly been taken before the more necessary general practitioners.

General practitioners are relatively of more value to the civil community than to the army, and ought therefore to be the last group to be enlisted in numbers. Such exemptions ought to apply more especially to practitioners outside the larger cities, owing to increasing difficulties in finding a suitable locum or neighbouring practitioners to carry on the practice. With troops in the field or for field ambulance duties, much of a general practitioner's experience, so valuable to the civil community, is not called for; and army hospital duties are most efficiently carried on by a few specialists with assistance in the wards from recent graduates who have shown an aptitude for specialized medicine or surgery.

In towns, women general practitioners and the over-age or partly disabled fellow-practitioners might combine to carry on a number of practices by means of bureaus, which would also undertake the clerical work. For units in the field and to complete field ambulances, recent graduates physically fit, and the younger the better, should be chosen. Fifth-year students who

have only their final examination to pass might be enlisted for six or nine months as probationer officers for duty in home general hospitals, just as they now act in civil hospitals; but the clinical lectures which are still given in their fifth year must then be advanced to their fourth year of study. Unless they are continuously available, students are not of much value as house-surgeons or house-physicians in military hospitals.

2. **Simplicity in finding the Most Suitable Officers for Hospital Formations.**—If technical and physical fitness of all medical men and women was recorded, the available specialists, with a record of their experience, could be readily ascertained. Finding establishments of suitable officers for new hospitals, and replacements of their sick or " stale " officers, would be simplified. Where a number of suitable officers can be found in one locality with a medical school or college, the nucleus or entire hospital staff may be under its patronage—*e.g.*, the University of Toronto's Canadian General Hospital. The advantages to the medical school are many, as the younger specialists would have the opportunity of experience in the field of, say, subtropical medicine and war surgery.

We may here refer to the value of the Territorial Force general hospitals on mobilization, and the administrative difficulties their existence caused in finding the hospital requirements of large new armies overseas. The strength of these Territorial hospitals was in their *à la suite* staffs of officers and nurses. These nurses and officers were enlisted during the previous six years of peace because of their recognized technical fitness or special experience. The twenty-three Territorial Force general hospitals were ready within ten days of the

outbreak of war to receive about 12,000 patients. Although allowed in October, 1914, to expand more or less, they were not expanded to meet the increasing numbers of casualties from overseas. War hospitals were formed in the same areas or at other centres, where suitable buildings were available, with staffs of medical men or women, most of whom were also partly withdrawn from local civil practice. The result was that in many civil areas the medical profession might conveniently have staffed more army beds, while other areas have undertaken more than their share. All the Territorial Force hospitals' *à la suite* were ideal as regards technical fitness, in readily mobilizing, and in causing the least disturbance to the civil community. But the war early proved too big a one for the medical profession and the trained nurses to provide such technically qualified staffs to meet the army's casualties. Appeals were early made to physically fit Territorial officers and nurses to volunteer for overseas service. Most of them readily accepted Imperial service obligations, and a number were seconded under general service conditions. Since early in 1916, when general service conditions became common to all the services, these Territorial hospitals and home war hospitals have had their clinical duties carried on by local specialists who are physically unfit for overseas, or by the physically fit officers who cannot be so readily spared by the civil community, and by women graduates or part-time civilian practitioners.

It was believed that the *à la suite* idea embodied in a Territorial hospital's establishments of officers and nurses would meet the demands of both the civil community and the army during any anticipated war; but

its parochial limitations hindered expansion, and the needs of their local civil communities limited the number of officers who could be conveniently seconded. There is an asset in the Territorial *à la suite* idea which has proved of much value in the home general hospitals —namely, the practical advantage obtained from officers working together who know each other's abilities or technical fitness, and also their limitations. The clinical value of this has yet to be proved in the several regular army general hospitals which have recently been formed with nuclei of officers seconded from selected Territorial hospitals or specially enlisted in certain civil areas.

3. **Conserving the Health and Technical Fitness of the More Valuable Medical Men and Women.**—The hospitals overseas clear their patients as speedily as possible, provided it is not prejudicial to their condition. Cases for operation of "election" are usually passed on to home hospitals, so that surgical technical procedure in the home hospitals may require a degree of judgment seldom requiring to be exercised when the condition is acute. It is otherwise with medical cases, as most of them are acute, and both investigation and treatment have to be speedily practised in the nearest hospital formation.

An interchange for a defined period between specialists who may be doing duty in home general hospitals with officers of like technical fitness in overseas general or stationary hospitals or in casualty clearing-stations might be arranged on a simple basis—*e.g.*, consent of O.C.'s concerned with concurrence of War Office.

There are many specialists who cannot be spared by the civil community for the duration of the war, and

others who are not physically fit to endure the hardships of field service for a lengthened period; but most of them would accept as a favour or as a duty experience overseas for a limited period. Such interchanges would be of intrinsic value in affording officers experience both at home and overseas, and also in preventing many valuable officers from going "stale." In a prolonged war such an interchange of medical officers may become necessary for maintaining uniform efficiency and conserving the health of specialists.

NURSING SERVICE

By Lieut.-Colonel P. Mitchell, M.D., R.A.M.C. (T.F.)

The number of nurses to patients, and the number of "trained" members to the "untrained," vary considerably in the three groups of army general hospitals at home and in the many general hospitals now overseas. In Territorial Force general hospitals, on mobilization, the proportion of nurses to patients was 1 to 5·7—*i.e.*, Principal Matron, Matron, 22 sisters, and 68 staff nurses, for 520 beds. The nurses were all fully trained; and the ward orderlies, now replaced by women cleaners, were only general duty orderlies. It was wasteful having these experienced trained nurses performing untrained nursing duties, and this was remedied by replacing one "trained" nurse by two "untrained" or V.A.D.s. This dilution brought the nursing up to 4·3 of the beds. Early in 1916 this ratio was reduced to 1 to 8—*i.e.*, 50 per cent. of the hospital staff (excluding the officers), which was not to exceed 25 per cent. of the number of beds. There was doubt whether the 25 per cent. referred to the occupied or the equipped beds.

The war (general) hospitals, which were formed later, have been mostly established in existing nursed public institutions—*e.g.*, parish or Poor Law houses or asylums—and the staffs retained to carry on with the army patients. It was found that unless additional nurses were posted a number of patients had to be retained

beyond their specialized treatment stage, so as to assist with the ward duties.

In the regular army general hospitals, nursing orderlies as well as ward general duty orderlies are still employed. "War Establishments, Part VII., New Armies, 1915," allows the following for 1,040 beds: Matron, 26 sisters, 46 staff nurses, and 50 nursing orderlies. This gives a nursing ratio of 1 to 8·5 beds.

In the large civil hospitals the ratio of nurses to patients varies from 1 to 2·5 to 1 to 4. Even in the more recently constructed hospitals—and the number of nurses may be reduced by structural conveniences—one nurse to three patients has been considered necessary. Patients in civil hospitals are supposed to require much higher nursing than the type of cases evacuated from overseas to the home general hospitals. This may be doubted if soldiers are only retained in the general hospital so long as they require specialized treatment or observation, when they should be immediately evacuated to the cheaper auxiliary hospitals. With a low rate of nursing this cannot be practised. Also, patients when at all able, and often to their detriment, get out of bed to go to the annexes, and when fit to move about must assist with ward duties; and those proving adaptable to such light duties are naturally retained for the benefit of their services. And clinical observations, valuable to the officers, cannot be maintained by the nurses, for want of time.

In a war with such large armies, it may appear necessary to economize by establishing a low ratio of nurses to patients; but if this interferes with efficiency —*i.e.*, to the prejudice of the patient, his early return to duty, or his ultimate cost to the public—the economy

may be doubted. The number of available willing and educated women, and of a type to make good nurses, has hardly been appealed to. Many such may not come forward unless the appeal is a direct one. It is not now a question of every nurse having had three years' training, but of numbers able to give supervised "untrained" assistance in the wards. The Medical Officers would prefer that all nurses were fully trained, but, apart from expense, it has to be accepted that the numbers available will not go round. The pre-war dilution of one first-year probationer in three of the nurses on duty in civil hospitals has been very much increased, owing to the number of trained nurses who have joined the army; and actual efficiency in civil hospitals has not been appreciably disturbed by the increased dilution. V.A.D. nurses in Red Cross or auxiliary hospitals have received an excellent introductory training. Many more of them would willingly be drafted into the army general hospitals, and such could easily be replaced in auxiliary hospitals by new members. It is desirable that V.A.D.s before being posted to overseas hospitals should be on duty for a short period in a home general hospital. These so-called "untrained" nurses might be graded into first-year nurses and nurses with over one year's service, recognized by distinctive badges and difference in pay.

In home general hospitals, provided the auxiliary beds available for recovering patients number two to three of the central beds, the nursing ratio should not be lower than 1 to 6 of 75 per cent. of the equipped beds, plus 5 per cent. for sickness, holidays, and cases requiring special nursing. This ought to be considered the permanent nursing establishment. When the number

of beds occupied exceeds 75 per cent., a corresponding number (1 to 6 patients) of " untrained " nurses to be posted from its auxiliary hospitals. The " trained " supervision will be weakened by the added dilution, which is only temporary. This emergency dilution may be accepted on the plea that a better remedy is not obtainable. The ratio of nursing, if all beds were occupied, would be 1 to 5·8.

The ideal dilution for efficiency is 1 sister to 3 staff nurses and 3 V.A.D.s (I.).

If the V.A.D.s are graded according to length of service, a lower, and quite a safe, proportion of trained staff might be adopted—*e.g.*, one sister and three staff nurses to three senior V.A.D.s and three first-year V.A.D.s (II.).

These establishments for 1,000 equipped beds are as follows:

I.

Matron	1
Sisters (1 Assistant Matron)	19
Staff nurses	56
V.A.D.s	56
	132

For 750 patients or less.

Eight additional V.A.D.s for every 50 beds occupied over 750. Nursing ratio, 5·8. Proportion of " trained " to " untrained," 7 to 5; if all beds are occupied, 7 to 9.

II.

Matron	1
Sisters (1 Assistant Matron)	14
Staff nurses	39
V.A.D.s, senior	39
V.A.D.s, first year	39
	132

For 750 patients or less.

Eight additional V.A.D.s for every 50 beds occupied over 750. Nursing ratio, 5·8. Proportion of " trained " to " untrained," 5 to 7; if all beds are occupied, 5 to 11.

Only one Matron is necessary for the largest of our general hospitals, but one Assistant Matron may be posted for every additional 500 beds over the first 500.

In Territorial Force hospitals the Principal Matron might be allowed a general service clerk, to be made responsible for all clerical duties—*e.g.*, pay, allowances, etc., so that the Matron and her assistants may be liberated for the actual nursing duties and discipline. The ward cleaners are under the Matron, but the general service women naturally come under the head of the clerical section, and the kitchen and laundry staffs under the Quartermasters. It is most essential for efficient nursing that the Matron and her assistants should be constantly in touch with the wards, and that their time be not diverted to clerical duties or in supervision of women performing duties not connected with the ward.

The size of a general hospital proceeding overseas is 1,040 beds, and the nursing personnel consists of—

Matron	1
Sisters	26
Staff nurses	46
Ward nursing orderlies	50
	123

Also 36 general duty orderlies as ward cleaners and for outside duties. V.A.D. nurses can easily replace the nursing orderlies. Many of these orderlies are wonderfully capable in performing nursing duties, but the average woman is more adaptable. The type of man who becomes an army nurse may not be worth the cost of a combatant's training, but, if unsuitable for other medical formations, he is of more industrial

value than a woman. The nursing ratio of 8·5 is low, and might be raised to 7·7, and the dilution of 5 orderlies to 7 trained nurses increased to 7 V.A.D.s to 5 trained nurses.

These changes would give the Matron the following staff for 1,000 beds for N.C.O.s and men, and 40 for officers:

Sisters (1 Assistant Matron)	18
Staff nurses	40
V.A.D.s or probationers	78
Nursing orderlies	0
	136

The 36 general duty orderlies should remain, as many of their duties—*e.g.*, stretcher-bearers' and those due to field inconveniences—are more suited to men than women.

KITCHENS AND COOKS

By Lieut.-Colonel P. Mitchell, M.D., R.A.M.C. (T.F.)

Site of Kitchen.—For rapid distribution, the kitchen block of a general hospital in the field should be placed near the centre of the camp, close to the main road, with the steward's store and the dining-halls adjoining. A site at an angle of the camp, away from prevailing winds and latrines, has obvious advantages; but a rapid service is so important that the central position should be accepted. The kitchen area must allow for considerable traffic and the placing of a number of outside stoves.

Accommodation.—On the lines of communication the kitchen of a hospital under canvas may have to be a field or compound one. One is described under "Camp Sanitation" (p. 99).

At a base, the kitchen block is usually in a hutted building. The floor space should be large enough, and with fittings sufficient, to cook for 50 per cent. more patients than the equipped beds, and also for the 200 or so other ranks of the personnel. Both the cooking staff and the fittings may consist of two sections. One section may be confined to preparing the "ordinary diets" and "ordinary extras" for wards and dining-halls, and also for the "other ranks" of the personnel; the other section for the preparation of special diets and extras and "no diets." The latter section is known

as the "Red Cross kitchen," and the cooks may be specially posted women. If so, a separate building should be allotted to them, and separate accounting with the steward. Should all the trained cooks be women, it will be more economical in labour and fuel to have both sections in one kitchen and under a head-cook. For convenience it is desirable to have the kitchen and annexes all under one roof; and each annexe should have outside and inside doors, with no intervening passage between them and the kitchens (*vide* Plate II.). The kitchen space in the sketch is not in excess of requirements for dieting 1,040 patients and 200 personnel, with the probability of sudden expansion in the number of beds. The vegetable store is naturally a preparation room, and requires water laid on and a large sink. Daylight should be obtained from the roof, on its north side, extending from end to end and two-fifths of its depth. On the south side of the roof, three-foot ventilators in every 6 feet, wire-screened and with rain-boards. All outside doors may be double, one to be of wire with spring self-closing hinges. All kitchen fittings should stand clear of the wall, and preferably in the centre. If the fuel is coal, coke, or wood, the chimneys are to be carried through the centre of the roof. Oil cookers are preferable, as labour and dust are less.

Cooks.—Early in the war an agitation was carried on in favour of women army cooks. The reasons stated for the change were—waste in hospital and camp kitchens, and men (soldiers) doing women's work when they were required in the fighting line. The waste was actually due to food not eaten, because it was not palatable to the new army men, who had been accustomed in civil life to more variety in their food, better

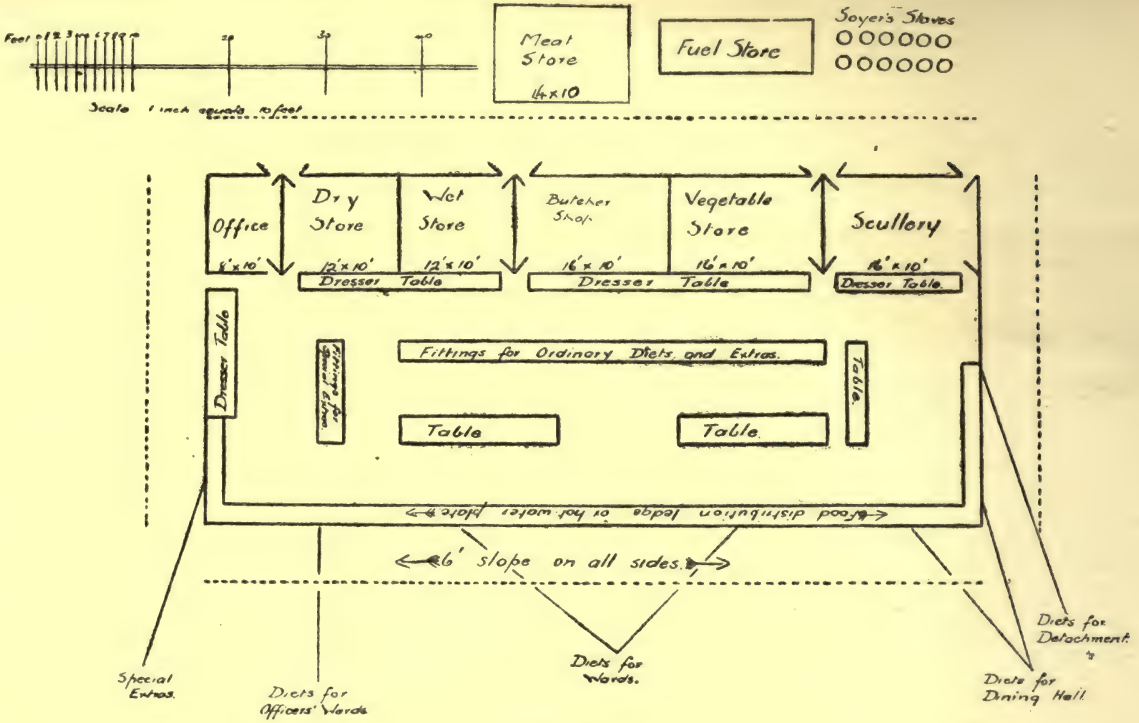

Feet 0 1 2 3 4 5 6 7 8 9 10
20
30
40
Scale 1 inch equals 10 feet
Meat Store 14x10
Fuel Store
Soyer's Stoves
Office 6'x10'
Dry Store 12'x10'
Wet Store 12'x10'
Butcher Shop
Vegetable Store 16'x10'
Scullery 16'x10'
Dresser Table
Dresser Table
Dresser Table
Dresser Table
Dresser Table
Fittings for Special Extras
Fittings for Ordinary Diets and Extras.
Table
Table
Table
Food distribution ledge or hot water plate
6' slope on all sides.
Special Extras.
Diets for Officers' Wards
Diets for Wards.
Diets for Detachment
Diets for Dining Hall

PLATE II.

cooking, and receiving it nicely served. The so-called waste was not a loss to the public purse, but to the individual soldier. The daily ration issued to each soldier is a fixed quantity, with a money allowance of about a third of the ration value to provide variety in the day's diets. If the food is not consumed, it is not a loss borne by the public; but it is a loss to the soldier, who has to make good from the canteen at his own expense, or carry on his training underfed. The popular reason for replacing male cooks by women was that the men would be available for fighting. Now, the Commanding Officers of our voluntary or new army soldiers invariably had their kitchen duties performed by unfits—*i.e.*, men physically or mentally worthless for fighting. Just as a number of women are physically and mentally able to be combatants, so you find in the army a number of men who are more or less physically or mentally unfit to be combatant soldiers, and who are content in carrying on duties better suited to the average woman. Such men are usually of more value than unskilled women in the labour market, and it would be national economy if they were discharged to civil life as soon as their combatant limitations were recognized. The essential reason for having army kitchens staffed by women is that there are sufficient women available, who possess the Diploma in Domestic Science, to undertake the "trained" kitchen duties; and that willing capable women, without such valuable training, are numerous enough to carry on the "untrained" duties.

Indifferent cooking and delayed distribution of food are as detrimental to the disabled as an inefficient nursing service. For the first fifteen months of the

war I was fortunate in having fairly good male cooks in a Territorial general hospital with four kitchens. As none of them were physically fit for the fighting line, I was naturally reluctant to replace them by women who were to be accepted on the recommendation of a centralized committee, and not by direct local enlistment. The general duties were to be carried on by casual women workers obtained from the local Labour Exchange. Ultimately eleven cooks were carefully selected locally by a voluntary sub-committee. The benefits, from the change to women cooks, were obvious from the first. They were placed directly under the Quartermaster, and the accounting difficulties were made easy for them. The general duties of the kitchen were also more satisfactorily performed by the untrained women than by orderlies; and only one orderly was considered necessary in a kitchen, for heavy lifts and as a butcher.

There is no reason why those on duty within all army hospital kitchens should not be women, each kitchen being under a head-cook, who would be responsible through the Quartermaster for accounting and the technical fitness of her staff, and to the Matron only for discipline. It would be more satisfactory establishing an Army Cooking Service on a similar basis to the Army Nursing Service, with grades of pay and allowances, the " trained " members to be confined to those possessing a recognized Certificate in Domestic Science, and the " untrained " may be posted from the Red Cross committees. The number of " trained " women who are available, with relatively little inconvenience to the civil community—*e.g.*, teachers of cookery in schools—would more than meet the demands

of all the overseas stationary and general hospitals and the home hospitals. There would be no difficulty in obtaining the number of educated "untrained" members, and they should be classed equal to V.A.D. nurses. If necessary or desirable in overseas hospitals, the rougher general duties would be continued by men who have been classed physically unfit for general service. Few of the men working in the overseas hospital kitchens as cooks, or for kitchen general duties, are physically or mentally fitted for the fighting line or the discomforts of the field; but a number of them might be absorbed by field ambulances or casualty clearing-stations as cooks, and the others returned to civil life.

The kitchen establishment suggested for a general hospital in the field with 1,040 beds (40 for officers) and 200 personnel is one woman head-cook; six women cooks, all "trained"; five "untrained" women cooks for general duties; and one general duty orderly for heavy duties and as butcher. The distribution of their duties would be as follows:

Sick officers - - -	One trained.
Special extras and "no diets" -	One trained and one untrained.
Ordinary diets and ordinary extras	Three trained and two untrained.
Night duty - - -	One trained.
General kitchen duties - -	Two untrained.

THE MEDICAL DIVISION

By Temp. Major A. W. FALCONER, M.D., M.R.C.P., R.A.M.C. (T.F.)

In an overseas base hospital in times of pressure, the cases have to be evacuated at the earliest possible date at which they are fit to travel, which means an increased strain on the medical personnel. Further, unlike the surgical division of the hospital, where the periods of greatest strain are generally of brief duration following some severe action, the strain on the medical side practically always depends on epidemic diseases; and these epidemics usually last, not for days or weeks, but for several months. Also it is just at these periods that the morbidity is heaviest in the medical personnel, and the staff is reduced when most needed. This particularly applies to units stationed in tropical and subtropical countries, and such units should carry an establishment 10 to 15 per cent. larger than the establishment for units stationed at home.

The officer in charge of the medical division is responsible for the diagnosis, treatment, and disposal, of all medical cases in the hospital. In times of stress, when 100 to 200 or more cases may be admitted daily, it is obviously impossible that he can be in touch with all the cases, and at the most he can do no more than see the most urgent ones, and exercise a general control over the routine treatment of the others. It is necessary, therefore, that there should be appointed a certain

number of true medical specialists to act as subdivisional officers, who would be responsible for a certain number of beds, and who would be able to carry out the more specialized methods of examination and treatment, such as intrathecal and intravenous injections. Such officers ought to have the rank of Major, and ought to be appointed solely on their technical fitness, and apart altogether from length of service. In the 1915 war establishments new armies, such officers were provided in the establishment of one Lieutenant-Colonel and two Majors for the medical division of a 1,040 bedded hospital. Unfortunately, these establishments have not been adhered to.

In addition to the divisional and subdivisional medical officers, a certain number of medical officers are required for duties in the ward. These officers, under the supervision of the divisional officer, are responsible for the treatment of the cases and the maintenance of the various clinical and military documents. It is neither necessary nor possible that these officers should be specialists in medicine; but especially in tropical and subtropical countries, where the type of work met with differs materially from home practice, and where the methods of examination and treatment are more specialized than in home practice, it is highly desirable that they should be chosen with a view solely to their technical fitness, and that, having once received a hospital training, they should not be removed for other duties except in real emergencies, and should be returned to these duties at the earliest possible date. A constant succession of medical officers with little or no hospital experience, civil or military, very seriously impairs the efficiency of a medical division.

In addition to the actual treatment of the cases, the medical officer is responsible for the maintenance of various documents, the most important of which is the case sheet A.F. I 1237. It is laid down in Regulations that a case sheet is only necessary in the most serious cases, and medical officers, especially those without hospital experience, are apt to consider the maintenance of a case sheet an unnecessary labour and a waste of time. It is not sufficiently recognized that, when dealing with large numbers of similar cases, a case sheet is essentially a time-saving device, as otherwise it is quite impossible to keep in touch with the various points in the individual cases, and much time is lost in re-elucidating facts already ascertained. A case sheet should therefore be compulsory in all cases. If a body stamp were added to A.F. I 1237, and the ordinary well-known symbols used in clinical medicine to denote alterations in the physical signs were adopted, much time would be saved, and with a little practice the time necessary to complete the case sheet would be reduced to a minimum. Whether the case sheet should be transferred with the patient, if he is evacuated for further treatment, is a somewhat difficult question. In the great majority of cases it is possible, with little expenditure of time, to give all the essential facts on a transfer certificate, and this has the advantage of leaving a full record of the case in the hospital, to which reference can be made should further questions arise about the case later, as sometimes happens.

The only other routine document which the medical officer has to maintain is the diet sheet, and with a little practice the time consumed in this is insignificant. The only troublesome feature of a diet sheet is the

addition, on discharge of the patient, of the various diets ordered, and there seems no reason why this should not be done by the administrative staff, and the time of the medical officer be saved for his more important clinical duties.

Granted that the clinical pathology is done in the pathological department, a medical officer with some hospital training should be able efficiently to take charge of from 100 to 120 beds.

Hospital Accommodation.—On active service a hospital may be accommodated in buildings, hospital huts, or tents. In warm climates there can be no question that the modern hut hospital is the most satisfactory, and would be difficult to improve on.

Equipment.—On mobilization, the medical division is provided with a generous scale of drugs, and any drug can be obtained from base medical stores on showing real reason for its use. The one particular in which the medical division is notably deficient is in the provision of microscopes. Only one microscope is supplied in the equipment of the pathological department of a general hospital of 1,040 beds, and none in the medical division. In a general hospital at the present date, more especially in a tropical or subtropical country, this is quite insufficient, and should be increased to at least three.

THE SURGICAL DIVISION

By Temp. Major G. H. COLT, F.R.C.S., R.A.M.C. (T.F.)

The surgical work in a general hospital in wartime differs in one important respect from the medical work. In most of the surgical cases it is necessary to inspect and dress the wounds, and in many to open them up, reapply splints, arrange for irrigation, etc., shortly after arrival. In some cases the administration of saline is necessary and perhaps the performance of a major operation. The admission of ten surgical cases may thus be the equivalent, as regards immediate work, of forty or fifty medical ones. When a large convoy of patients arrives the administration sorts them out and distributes them to the wards, where, after they have been undressed, washed, and put to bed the medical officers go over them and decide, in conjunction with the surgical specialist, on the course of treatment to be adopted. It may happen, if the specialist is engaged in the operation theatre, that a system of report has to replace the better practice of consultation. In order, therefore, to make the work of the trained staff as easy as possible the arrangements must be sufficiently elastic to allow of a large turnover in a short time without any backward accumulation of clerical work, so that in times of less pressure they may be able to take stock and recuperate, and prepare for the next period of pressure. This particularly applies to the nursing staff. The first essential, therefore, is to reduce all clerical

work to a minimum. Our object should be to act as a link in a chain the end of which results in the cure, disposal, or death of the patient, and it is evident that such clerical work as is necessary should be done in a manner that will save its repetition in succeeding units. That is to say if it is done in a brief manner and passed on with the patient it may not only, as heretofore, be of value to medical officers of these units but also save their clerical staff needless repetition. The necessity for repeatedly filling up the identification particulars of any patient on medical case sheets, temperature charts, diet sheets and transfer certificates in each unit that the patient passes through is wearisome and can be largely avoided. A less discontinuous account of his case could ultimately be presented to the War Office for statistical and clinical study than is possible by present methods.

The Wall Card.—With this end in view a single card to be known as the " wall card " might be prepared in the admission room. See Plate III. This card would be designed in such a way that it would suffice for the diet sheet, medical case sheet, temperature chart, and transfer certificate, and it would accompany the patient when he leaves hospital, as will be presently explained. There would be a pocket on the lower half of the back of the card closed by a flap fastened by means of two dome fasteners. Into this pocket all the labels, cards, notes, pieces of temperature charts, etc., which arrive with the patient would be placed, and from time to time any prints of X-ray photographs, reports on the results of screening, pathological reports, long-continued temperature charts, etc. The filling up of the heading of the card would be done in the following manner:

o o

Wall Card A

Regt'l No.	Rank and Name (Surname first)	Corps.	Squadron Troop Company or Battery	Age	Service	Military Decorations	File number, ward number, and other Office Records.
10133	Cpl Smith J A V	DCLI N A	26 Div 79 Bgde. B Coy.	21	1 9/12 9/12		

Name of Hospital	Date of Admission	Date of Discharge	Ward No. or Name.	Injuries	Diseases	Disposal	Death.	Signature of Medical Officer.
48 General	Dec. 17th	Jan: 3rd.	K. 44	GSW Spine.	Malaria	Hosp'l Ship		
H S Delta	Jan: 3rd.	Jan: 11th.	A. 3.	GSW Spine	Malaria	Hosp'l Train		
3 Southern General	Jan: 12th	Feb: 20th	C. 2	GSW Spine.	Malaria.		X	

Name of Hospital	CLASS OF DIET WITH DATE							EXTRAS WITH DATE							
	Milk	Beef-tea	Chicken	Ordinary	No Diet			Milk	Beef-tea	Custard					
48 General	Dec 17th	Dec 21st		Dec 27th											
H S Delta				Jan 3rd											
3 Southern General															

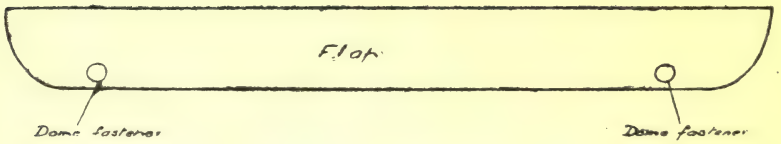
Day of Disease or Injury

Temperature Fahrenheit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
105°																												
104°																												
103°																												
102°																												
101°																												
100°																												
99°																												
98°																												
97°																												
96°																												
Pulse Per Minute																												
Respirations per Minute																												
Motions in 24 hours																												
	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
105°																												
104°																												
103°																												
102°																												
101°																												
100°																												
99°																												
98°																												
97°																												
96°																												
Pulse Per Minute																												
Respirations per Minute																												
Motions in 24 hours																												

Over

PLATE III.

BRIEF NOTES OF THE CASE.



Pocket

Over the heading a strip of blackened paper would be placed and on the top of this a second piece of paper printed and ruled at the top to correspond with the ruling on the top line of the wall card. This top piece of paper would be sufficiently large to allow a short abstract of the case being made on it subsequently and it would be removed and filed alphabetically on one of twenty-four "admission" files. Later, when the patient is notified for discharge, the wardmaster would bring this slip to the medical officer who would enter on it a short abstract of the case, or in some cases merely the diagnosis, and would return it to the clerk of the admission room. It would there be filed alphabetically on a second set of twenty-four "discharge" files. Thus an admission and discharge record would be kept and at any time the number of patients in hospital could be ascertained. A refinement of this system would be to divide each file into two—namely, medical and surgical.

The wall card would be sent to the ward and hung up over the patient's bed. It would not be necessary to take precautions to prevent the patient from reading the notes on the back of the card except in certain special cases. Personally I find that if the patient is trusted and treated like a human being his confidence is gained and there is no tendency to malingering. There has only been one case of malingering in my wards in the 1st Scottish General Hospital from August 4, 1914, to August 4, 1916 and this patient had sufficient symptoms to show that the question was a doubtful one. These patients did not actually read their notes but were kept informed of the progress of their cases and whether any particular kind of treatment was

desirable or not. Conversely, in several cases where the patients were admitted as supposed malingerers they were cured by this method of mutual confidence. If the patient is not trusted or informed about the progress of his case he is apt to worry about the matter and to tolerate treatment badly. By keeping the wall card at hand the saving of mental effort and of time is considerable and the work of the medical officer becomes easier and more congenial. Inasmuch as it often happens that the number of cases is large or that they are admitted and discharged after only a short period in hospital the medical officer is obliged to trust largely to short notes. By the adoption of the system suggested all the available information would be ready at hand at the patient's bedside. It will be noticed that the temperature chart is sufficient for an eight-weeks record. When required the four-hourly chart should be interspaced with the night and morning records either by subdividing the vertical spaces or by spreading the dates over twice the distance.

It is intended that the wall card should pass with the patient to the hospital ship, convalescent camp, or regiment to which he is sent the intermediate parties keeping for themselves an abstract of the case should they require to do so, or should any useful purpose be served by their so doing. From the regimental medical officer, or other medical officer should the patient die or be discharged as permanently unfit, the wall card would be sent to the War Office for the ultimate working up of the facts, the collation of cases, etc. It could be filed as a card in a card index and thus the necessity for the index which is now being prepared at great cost would be avoided.

When the patient is marked for discharge the ward-master would take the wall card to the clerk of the admission and discharge files who would make the necessary entry on the admission slip and transfer the slip to the discharge file. He would return the card to the patient who would take it with him. If it were considered necessary to retain a note of the case the medical officer would make it on the slip that is retained as has already been mentioned. In a certain small percentage of cases this note may prove useful should the patient be readmitted, or be admitted into another hospital in the same district, but in the great majority of cases it will be of no further use. A note of the diagnosis would be made on the slip so that inquiries could be answered. The saving in stationery alone if this suggestion were adopted would be considerable. The envelope form M.R.C. 5, W.O. letter No. 121—Medical 2757, A.M.D. 2, is an attempt to deal with the smaller half of the problem.

Diets.—On the admission of a patient to hospital the medical officer would make a short note of the case on the back of the wall card abstracting the particulars available on the labels, etc., sent with the patient. He would then write on the card the name of the diet most suitable—viz., milk, beef-tea, ordinary, etc.—and any extras; or, if these headings were printed he would merely write the date in the space provided. By suitable grouping of foods this process could be rendered short. The sister of the ward would summarize the wall card diets and some latitude should be allowed in this respect. For instance it should be possible to draw on verbal demand sufficient food for any patient admitted at any time—that is to say the "dining-

hall" system would be applied to each ward and any article of diet or of drink would be included in the summary. The system would be run entirely on trust as between the wards and the kitchen and the auditors would accept the sisters' summaries instead of those prepared by the registrar. If considered necessary the medical officers in the wards would sign the ward summaries, but as regards checking by an accountant both methods are equally valueless. It would probably be found satisfactory to appoint a V.A.D. assistant to take charge of the summaries, etc., to arrange with the cook for the delivery of the food and to arrange for its distribution; but while this might answer on the surgical side of the hospital the extras and special invalid foods required on the medical side are sometimes so numerous that it might be necessary for the sister herself to supervise the V.A.D.'s work. Some such system, if adopted, would relieve the medical officer and the sister—*i.e.*, the trained workers—of a great deal of clerical work, work that they really have no time for in times of pressure. It will be noticed that by this system the medical officer has no repeating of diets, no obliterating of spaces to do, or final additions to make; all that he has to do is to indicate the name of the diet and cross it out when a change is made. Even in peace-time it is waste of time for a medical man to have to do clerical work of this nature. It is open to argument, and certainly to experiment, to ascertain whether such a system would be more wasteful than that at present in use; and if such were found to be the case to estimate whether the cost of this wastage were greater or less than the value of the time saved to the trained staff. It is, for instance, well known that

sisters may be obliged to spend hours in trying to account for a pennyworth of tea. It is also an axiom that high-class surgical work can be done best of all when the staff are fresh. Every change in present methods likely to attain this end should be given a trial provided that it can be effected without throwing extra work on any other part of the system.

The Surgical Ward and its Equipment.

The scale of equipment is given on p. 71.

As a result of experience, the following criticism is made: When two stoves with flues attached are supplied for each surgical ward of twenty-six beds two beds should be omitted thus reducing the number to twenty-four. The extra gain of space is of great value, and if it can be granted it well repays the need for providing additional accommodation in the shape of tentage for convalescent patients who require relatively little attention. The advantage of keeping a ward half filled with heavy cases is greater than that of increasing the staff in the ward and filling the vacant beds with convalescent patients.

The War Office pattern of hut is designed to allow of one bed being placed between two adjacent windows with the corresponding locker below the level of the adjacent window frame. The arrangement of the joists of the roofing is then found to be convenient for the suspension of a bed-pulley for each bed. Such an arrangement would greatly save the nursing staff in heavy cases. If a detachable type of pulley were designed it would only be necessary to have a third of the number for any given number of beds. The joist

is also convenient for suspending a mosquito curtain where such is required.

A dressing trolly is a labour-saving device and should be regarded as a necessity. The chief point about such a trolly—and the same remark applies to trollies and wheeled hospital furniture in general—is that the castors should be mounted on horizontal ball-bearing races. There is a marked difference in efficiency between such a trolly and the slightly cheaper variety without ball bearings. The difference in cost can be saved by making the shelves of wood or of thin sheet steel aluminium-painted instead of using glass. For ordinary purposes the latter is unnecessary. When no trolly is available for a floored ward a suitable table with under-shelf should be provided and the same holds good for a tent.

It is scarcely necessary to mention that a ward clock is a necessity if any check is to be kept on the running of the system of ward work. Electric standard lamps also are practically a necessity and should be included in the scale of equipment being useful for the examination of patients, for facilitating nursing and for doing minor operations and dressings in the ward. Their use also enables the patients to read in greater comfort. The minimum number of screens required is five; the original scale allowed one, and one more has been added since. It should be noted that the hinges of the screens should be of the simple " universal " type which allows a relative movement of one flap of the screen on the flap adjacent to it of 360 degrees. This kind of hinge is usually made of webbing or leather. It is cheaper, stronger, and less likely to be broken than is a metal hinge which only permits a relative move-

ment of 180 degrees. A contractor will always take advantage of ignorance. He may himself be ignorant of the advantages of the "universal" type of hinge or may not care to suggest its employment. A roller should be supplied for the roller towel and a pair of forceps for removing instruments from the sterilizer. The pattern of pedestal table supplied in wood, with rack adjustment, is rickety and usually broken or out of repair. Better, lighter, stronger, and more portable tables of the same type can be obtained made in metal at a less cost. The same remarks apply to the patients' lockers which should be of a type collapsible for packing and made in thin sheet steel japanned white.

Only one Lane's infusion apparatus is supplied for the whole unit. In busy times at least one infusion apparatus of the labour-saving kind is required in each ward, medical as well as surgical. In the dysentery and malaria wards more than one each may be needed and in cholera wards one would be required for every seven beds. Soutar's Thermos flask apparatus is efficient and easily managed. The saline in it keeps hot for a longer time than is the case with Lane's apparatus and the temperature also is more easily ascertained.

There should be no hard-and-fast rule as to the drawing of the blue hospital kits for a patient on admission. Such kit is not required in the ward until the patient is able to get up. If half a dozen spare kits were kept in the ward it would be a sufficient supply for the patients who are allowed up when the ward is heavy, a larger number would be required when the ward is full but light. On the admission of patients

in quantity the sisters and orderlies have plenty to do without having to attend to blue kits.

Surgical Dressings.—The sisters should be able to draw their supplies of dressings from a store of such ready made according to War Dressings Depot patterns, as distinct from the earlier Red Cross patterns, because the former are now made under the supervision of fully trained nurses whereas the earlier Red Cross patterns were limited in number and were largely the design of untrained persons. The same remark should apply to made bandages and padded splints. Roller bandages, triangular bandages, gauze, wool, lint, etc., should be drawn from the dispensary. It is important that a general hospital should be equipped at the time it is sent out with a large stock of these made dressings, bandages, padded splints, etc., and that arrangements should be made for the replacement of the stock of these articles, just as the stocks of raw materials are replaced in the dispensary stock. Their employment saves a vast amount of work and reduces the waste of raw materials. The manufacture of these munitions should no longer be regarded as charitable work but as Government work. The patterns should be standardized and the work should be paid for. Incidentally it may be mentioned that the use of wound varnish (gum mastic and benzine) in conjunction with wool and gauze saves an enormous quantity of dressing materials.

Linen.—All linen, more especially operation gowns, towels, etc., used in the theatre or wards by the staff, and all linen used by the patients, should be washed at least once before it is supplied to the unit. A certain amount of inconvenience arises, especially in the opera-

tion theatre, from the use of stiff linen issued new for the first time. It is important to arrange that the washing sent from the operation theatre should be returned to it instead of having new articles issued in place of those sent to the wash. The inconvenience in this respect is perhaps greatest of all in the theatre where towels and operation gowns are constantly being packed into drums and taken out and used. These processes are more easily carried out when the linen has been softened by several washings. The scale of equipment in respect of operation gowns and towels appears to be totally inadequate for anything but peace-time work unless it is supposed that they can be washed immediately after use, dried and sterilized, within a few hours.

Surgical Instruments and Equipment.—The surgical instruments and equipment should be packed in cases the tops of which are fastened by means of screws. Such cases are more easily unpacked than are those in which the tops are nailed down and are less damaged in the process. It is important that suitable tools, in this instance screwdrivers, should be available on arrival. The amount of time lost during the unpacking of our surgical material was considerable owing to the lack of simple tools. A store tent, known as the "surgical store," should be pitched for containing the made surgical dressings, bandages, etc., together with the splints, cradles, etc. It is important that these things should be kept separate from Red Cross comforts, and an orderly, who preferably should be a mechanic, should be in charge of the store. He should be provided with a work bench and tools suitable for carrying out minor mechanical operations.

The following articles will be found suitable: One parallel jaws, screw motion vice, 3½ inch jaws opening 4½ inches, with screws for fixing complete; one engineer's hammer, 2-3 pounds; one claw hammer; one small metal, screw feed, vertical drilling machine and set of six each Morse twist drills, ⅛ inch, $\frac{3}{16}$ inch, ¼ inch; two flat 10 inch parallel files (fine and bastard cut); two triangular files, 7 inch (fine cut); two half-round 10 inch files (fine and bastard cut); one round taper file, 10 inch (coarse cut); one round taper file, ¼ inch (fine cut); one round taper file, ½ inch (fine cut); one mounted file cloth; one taper broach, ⅛ inch to ½ inch; one strong pliers; one pincers; one pair plumber's pliers; two strong screw wrenches; one small anvil; one brazier's blow-pipe; one medium size soldering iron; flux; brazing wire; solder; one hack-saw frame to take 8 inch saws; one dozen spare saws (Star pattern); one universal shears (Ash and Co.); one medium size rip saw; one small size panel saw; one small size bench saw; two keyhole saws; one smoothing plane (American pattern); two rasps, half round, 8 inch (medium cut); two cabinet-maker's half-round files, 8 inch; one chisel, 1 inch; one chisel, ½ inch; one leather punch, grip pattern, with six revolving bits; one eyelet-inserter with stock of eyelets, hooks and laces; one gouge, ½ inch; one wooden mallet; one screwdriver, medium size; one screwdriver, small size; three bradawls, large, medium, and small; one centre punch; one wood-nail punch; one countersink with cross-handle; one oil-can (engineer's pattern); one cold chisel, 1 inch; one cold chisel, ¾ inch; one cold chisel, ½ inch; two dozen sheets of glass-paper (Oakey's No. 1); two dozen sheets of emery-paper, coarse, medium, and fine; and any special tools, grips, etc., used in

working the particular pattern of skeleton splinting that happens to be in fashion. The approximate cost of this outfit is £6 and the total weight is about 60 pounds.

The surgical store should be fitted with suitable racks. It would be an improvement on the present entire absence of any such provision throughout the hospital as despatched if arrangements were made for a supply of portable (collapsible) steel racks similar in design to those in common use by wine-merchants. For storing dressings and the smaller types of splints, the empty hinged boxes in which the medical stores are packed are useful and do not occupy much space when piled up on each other; but the number available is insufficient, nor are they available immediately on landing. The rackwork arrangement would be useful in base supply stores and in other branches of the service. By suitably designing the struts and corrugating the shelving the strength of the available supports could be made suitable for any weight likely to be met with and yet be light and portable. A study of the subject by an engineer in the light of the requirements would be well repaid by the results.

The splints supplied on mobilization are sufficient with the recent additions to the list. The grip arrangement for fixing the extension apparatus (Guy's pattern) to the bedsteads is designed to fit the angle iron of a bedstead at home and does not fit the round rail of the active service bedstead. The screws and fixings for these arrangements should be made in iron and blacked. Some of them are made in brass which is a needless waste. The system of aluminium splinting is efficient and is better and more easily worked than the steel rod system. The great diversity of wounds

renders such a system exceedingly useful. Suitable splint pads should be supplied for the more commonly used splints, especially for the "backsplint with foot-piece," because much soiling of the pads is inevitable and on active service there is no time or labour available for making properly teased and sewn tow pads, so that often cotton-wool has to be employed for the purpose at a cost of perhaps 5s. per pound. It is not as good for the purpose as a properly made tow pad.

Surgical Instruments.—The first point that suggests itself in criticizing the stock of surgical instruments is that the selection has been unequal. For instance, there are six dozen Lane's tissue forceps—that is to say a sufficient number for twelve surgeons all operating at the same time and all using the maximum number likely to be used in any wound. Conversely there is not provided a single peritoneum forceps or towel clip nor a single round-bodied, non-cutting needle, out of the total number of 1,776 available on mobilization. With a cutting needle it is difficult or impossible to close the peritoneum if it is inflamed or if the anæsthetic is not being taken well. All the needles, with the exception of some of the bowel needles, have the old-fashioned eye; the Paterson-eyed needle, or any of the other patterns of non-slipping eyed needles being absent from the stock. Many surgeons now use this type of needle which is one of the great time-saving improvements in surgical technique of the last ten years. As pointed out elsewhere, there is only one saline infusion apparatus of the labour-saving type for the whole hospital.

In the second place it is open to question whether any bone-plating operation is advisable on active

service. Occasionally a good result is obtained in certain cases of compound fracture in which the bones cannot otherwise be kept in good position but in the great majority of cases plating is better avoided. In view of the generally accepted character of the atmosphere in a theatre in which recent wounds are operated on, and in view of the extra labour involved in maintaining a separate aseptic theatre, it is also questionable whether a surgeon is justified in plating a fracture in an aseptic case. If these suggestions hold good it is clear that all the bone-plating instruments, of which three sets are provided, can be omitted from the equipment; but in view of the possibility of their being required perhaps one set of such instruments together with a sufficiency of plates and screws should be retained.

In the selection of surgical instruments it is well known that a difficulty arises in pleasing all operators; but this perhaps refers more to some of the rarer instruments in use than to those more commonly employed with which almost any surgeon can manage to operate efficiently. Of the artery forceps supplied Barker's pattern is perhaps in less general use than any other. The disadvantage of this pattern is that the width of the blades interferes with vision and takes up an unnecessary amount of room in the wound while the supposed advantage that a ligature can be more easily applied than in the ordinary pattern of Spencer Wells' forceps is not borne out in practice. It would therefore appear that the six dozen Barker's forceps should be replaced by Spencer Wells' pattern. With the provision that one large theatre is in use instead of three small ones four dozen such forceps will be sufficient. Similarly one dozen Guy's pattern (7½ inch)

will suffice instead of the three dozen supplied as they are seldom required. The three dozen Mayo-Ochsner forceps should remain but it may be noted that the pattern supplied lacks the delicacy and finish seen in a good forceps of this type. They make most efficient bullet extractors and can also be used as peritoneum forceps when the opening in the peritoneum is relatively large. For surgeons who prefer to prepare their own catgut locally there should be some provision either in the form of Jellett's or Mayo Robson's catgut sterilizer, in which case a supply of formalin catgut must be available, or in the form of covered-in vessels in which the catgut may be soaked or stored. Suitable spools should be provided, because many surgeons now use the one-handed knot, and it is difficult to tie this off a hank of gut such as is supplied in tubes (Leuken's).

As regards the other instruments not included in the above:

2 hernia directors may be omitted, leaving 1.
2 Hoffmann's gouge forceps may be omitted, leaving 1.
2 lion forceps, Davy's, may be omitted, leaving 1.
2 necrosis forceps, straight, may be omitted, leaving 1.
2 necrosis forceps, bent, may be omitted, leaving 1.
54 pairs Lane's tissue forceps may be omitted, leaving 18 pairs.
1 Porter's anæsthetic syringe may be omitted.
18 rectal bougies may be omitted, leaving 6.

While the following instruments are in common use and might with advantage be included:

2 local analgesia syringes, Gray's pattern, with nozzles and needles complete in case (Down Bros., No. 4736*b*).
12 dozen each size (2 sizes) spare needles for same.
18 towel clips, sugar-tongs pattern (Down Bros., No. 6351).
6 peritoneum forceps, Mikulicz's screw joint (Down Bros., No. 95).

12 peritoneum forceps in the shape of 12 curved Ochsner's forceps, screw joint, without tenaculum points (Down Bros., No. 6325).
4 dissection forceps, Leedham Green's, 5¾ inch (Down Bros., No. 291).
2 retractors, Morris's 2½ inch (Down Bros., No. 145).
1 automatic wound retractor, Cameron's (Down Bros., No. 122).
1 stomach clamp, Childe's (Down Bros., No. 6940).
3 pairs Mayo's scissors, straight, 5½ inch (Down Bros., No. 6386).
3 pairs Mayo's scissors, straight, 7½ inch (Down Bros., No. 6388).
3 pairs Mayo's scissors, curved, 6½ inch (Down Bros., No. 6390).
3 pairs Mayo's scissors, angular on the flat, 8½ inch (Down Bros., No. 6392).
1 dozen spring rings, 2½ inch, for holding instruments together while being boiled (Down Bros., No. 39*a*).
2 silkworm gut forceps or suture holder (Down Bros., No. 744).
1 Macewen's mastoid scoop (Down Bros., No. 647).
1 Stuart Low's mallet (Down Bros., No. 499).
1 small mallet (Down Bros., No. 498).
1 mastoid chisel, $\frac{3}{16}$ inch (Down Bros., No. 581).
1 mastoid gouge, $\frac{3}{16}$ inch (Down Bros., No. 605).
1 mastoid gouge, $\frac{5}{16}$ inch (Down Bros., No. 605).
1 Wilde's forceps (Down Bros., No. 1750, or Politzer's, No. 1741).
1 mastoid retractor, Allport's (Down Bros., No. 637).
1 tuning-fork, C (Down Bros., No. 1898).
1 copper spatula, N.P. (Down Bros., No. 125*a*).
1 wire cutting and twisting forceps (Down Bros., No. 1229).
1 skull forceps, for removing trephine disc (Down Bros., No. 652).
1 steel director and Podrez's conductor for Gigli's saws (Down Bros., Nos. 660 and 661).
1 Liston's bone-cutting forceps, angular (Down Bros., No. 409).
1 Hey's saw (Down Bros., No. 654).
1 Horsley's laminectomy forceps, 13½ inch (Down Bros., No. 572).
1 pair Wyeth's pins (Down Bros., No. 147).
1 Lynn Thomas's tourniquet forceps (Down Bros., No. 159).

6 Butlin's laryngotomy cannulæ, medium size (Down Bros., No. 1445).
1 Reverdin's needle, curve A (Down Bros., No. 901).
1 Jellett's catgut sterilizer for use with alcohol, with wooden clams for opening (Down Bros., No. 10,024).
12 dozen wood or glass winders suitable for use with same.

Note.—If a chemical method of preparation is adopted, the number of winders will have to be largely increased. In the latter case a convenient form is a piece of glass tubing 2½ inches long and ½ inch in diameter, with ends rounded off. Wooden spools are also excellent.

1 Lorenz, long model, plaster of Paris shears (Down Bros., No. 7141).
1 siphon stomach wash-out (Down Bros., No. 1622).
1 cautery (Down Bros., No. 3721).
(1 Pacquelin cautery would be an excellent addition provided its cost is not too great.)
1 Paterson's anæsthetic screen (Down Bros., No. 9621*a*).
6 sponge-holding forceps, 7 inch (Down Bros., No. 1579).
3 sponge-holding forceps, 9½ inch (Down Bros., No. 1579).
1 Hey Grove's brace for perforating bone, and half a dozen bits for same.

All the needles supplied (1,776) could without disadvantage be omitted, and the following list substituted:

6 packets of 6 each intestinal needles, half-circle (Down Bros., No. 841).
2 packets of 6 each intestinal needles, half-circle (Down Bros., No. 850).
3 dozen each Paterson-eye, round-bodied, fully-curved needles, sizes 3, 8, and 14 (Down Bros., No. 6436).
1 dozen each of ditto, ordinary eye.
3 dozen each Paterson-eye, triangular, fully-curved needles, sizes 2, 5, and 12 (Down Bros., No. 6439).
1 dozen each of ditto, ordinary eye.
2 dozen eye needles (for dura mater, etc.), assorted sizes, 1 to 6 (Down Bros., No. 805).
2 dozen Lister's suture needles, half curved, assorted sizes, 1 to 12 (Down Bros., No. 851).
2 dozen Lister's suture needles, straight, assorted sizes, 1 to 12 (Down Bros., No. 853).

This list of needles does not include any straight bowel needles. These are seldom used at the present time, and if required an ordinary sewing needle answers the purpose.

The Operation Block.

Although personally we have had no experience of the use of the *operating tent*, we judge, from what we see and hear in the practice of others, that it is too small and poorly lit to be of a high degree of efficiency, such as is needed in the field. In practice a hospital marquee or a store tent is used as an operation theatre, the small operating tents being used for purposes of sterilization, washing of linen, etc. The operation block of a hospital in the field is the hub of the surgical section. The War Office pattern of hutment is not altogether suitable for a quick turnover of septic cases from 520 beds in a short time, although it would be excellent as a peace-time theatre for serving 120 beds the cases in which are largely aseptic in character. The unsuitability arises chiefly by reason of the available floor space having been divided up too much. By the courtesy of the command the operation block at 43rd General Hospital was altered from that shown in Plate IV. to the arrangement shown in Plate V. The change effected will be at once appreciated when it is stated that the large theatre was originally only half its present size. As will be seen on comparing the two figures, a transverse partition extended across the middle of the chief floor space from one side to the other, and other partitions divided up the available space still further. This arrangement provided a small washing-up room adjacent to the large theatre, an anæsthetic-room

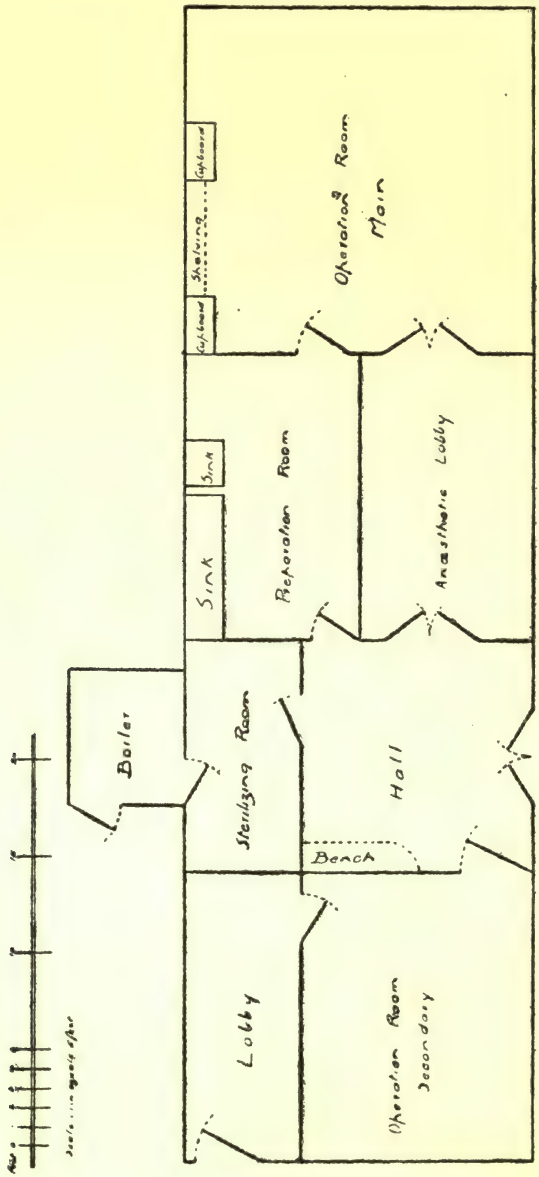
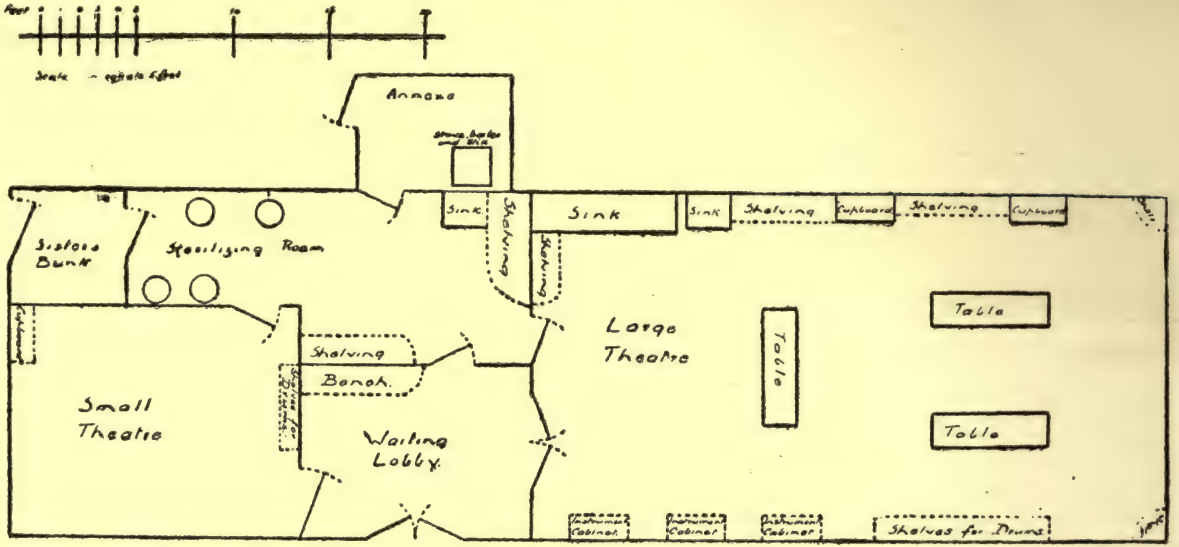

Operation Theatre Suggested alterations to interior
Operating Room Main
Anæsthetic Lobby
Preparation Room
Sink
Sink
Cupboard
Shelving
Cupboard
Hall
Bench
Sterilizing Room
Boiler
Operation Room Secondary
Lobby

PLATE IV.



Operation Theatre *after* alterations to interior

PLATE V.

adjacent to the large lobby and theatre and a small and useless lobby adjacent to the small theatre. The large theatre, which was supposed to be used for aseptic cases, was only workable efficiently with one table at a time. By removing the partitions in the larger space, by moving the partition between the large lobby and the sterilizing-room nearer the lobby door, and by abolishing the partition between the small lobby and the sterilizing-room the accommodation in the block has been trebled and a large saving in personnel effected. The question is one of the best utilization of the floor space available and of the provision of a good light and of a good supply of water.

In peace-time a skilled anæsthetist prefers not to have the patient moved from a trolly to the operation-table after he is under the influence of the anæsthetic because of the interference with the airway and because of the abdominal disturbance. The operation-table is therefore usually wheeled into the anæsthetic-room and the patient placed on it before the anæsthetic is administered. This is not possible with Gibbons' portable table, neither is it necessary. Another reason why army patients in particular should not be anæsthetized before they are placed on the operation-table is that most of them are big, strong men in splendid training and they are apt to behave as such during the administration of the anæsthetic. Whether it was intended that the patient should be lying on a stretcher on the floor of the anæsthetic-room during the administration of the anæsthetic, or whether some other arrangement was contemplated, is unknown. The patients do not object as a rule to being placed on the table with other operations proceeding at adjacent

tables. Movable screens are placed between the tables. There is therefore no necessity for having a separate anæsthetic-room.

By using three tables in one large theatre a good deal of time is saved. With two surgeons, two anæsthetists, and two assistants, working at the same time the next case is placed on the third table ready for the anæsthetist to begin while the last case is being removed and the operator and his assistant are washing up. When three tables are in use at the same time the next case waits in the lobby of the theatre; but if there were exceptional pressure it might be necessary to pitch a small marquee adjacent to the operation block and X-ray department, both of which are close together, so that both departments might be served and the cases taken from the X-ray room direct to the theatre.

The small operation theatre is reserved for an occasional aseptic case, for ophthalmic operations, and for the application of plaster of Paris splints. It is also useful as a sisters' room for making up dressings, for sewing, etc.

The original hutment operation block has no roof lights. These are essential and preferably should have a north aspect and be made as a canopy so that they can be opened and shut. An additional improvement would be to have a small lavatory attached to the boiler-house annexe. The still for serving the hospital with distilled water has conveniently been built in over the boiler fire. This may prove inconvenient as regards theatre work in hot weather.

The artificial light in the large theatre comprises one set of four universal jointed arms, each with a 60 candle-power incandescent electric light at its end, at one end

of the theatre (the original large theatre) and a set of five incandescent electric lights of 60 candle-power each, one mounted centrally, and the others at the four corners of a wooden tray 2 feet 6 inches long and 2 feet wide towards the other end. The latter arrangement is more simple and efficient than that of the jointed arms, which, although one can concentrate light from all four lights in any one direction, is apt to be cumbersome and to get in the way. In connection with the switches there are wall plugs for hand lights so that the jointed-arm arrangement becomes unnecessary. The acetylene lamp is kept ready for use should the electric current fail. The interior of an operation theatre should be coloured light green. This gives nearly as much reflected light as white and is much more restful to the eye.

All the doors in a theatre of this type should be hinged to open in both directions and should tend to close slowly by means of light springs in the hinges. Stops should be provided for holding them open if this should be required. The door between the lobby and the small theatre should either be made to open inwards only, or preferably should be made as a sliding panel, so that the action of the lobby doors during stretcher-carrying is not interfered with. The edges of all doors at and near the level at which the hands of stretcher-bearers come should be well rounded off.

If this altered theatre were being designed *de novo* certain minor alterations might with advantage be effected in the washing-up arrangements. If a wider pattern of hutment were available it would give just the extra yard or so required in the large theatre for complete efficiency. In Plate V. the shelving near the

sink in the sterilizing-room is that used for scrubbing mackintoshes.

The Gibbons' portable table, although very good and strong, is not the best of its kind. A better table, equally portable, is Paul's (Down Bros., No. 9599). For every three such tables one set of leg-supports and webbing foot-pieces should be provided. For each table a webbing band and buckle should be ready for use to secure the patient lightly just above the knees during the induction of anæsthesia. Wrist straps are also useful. With Paul's table the Trendelenburg position is attained much more easily than with Gibbons' table. The table itself is firmer. A containing case similar to that supplied with Gibbons' table could be designed and already partly exists in the form of a fibre box for packing the table for carrying on a motor-car. The chief points mentioned in this paragraph have been known for many years and special attention was directed to them in an article on a portable operation theatre (*Brit. Journ. of Surg.*, vol. i., No. 1, 1913), a copy of which was sent to the War Office.

In an operation theatre in war-time, as also in peace-time, all the interior metal fittings should be dull. This is expressly to prevent the staff from wasting their time polishing door knobs, copper urns, etc. All the drums for dressings should be made of dull metal—*e.g.*, aluminium, brass, or copper—and express orders should be given that copper or brass or other metal fittings or vessels are not to be polished. The waste of time and energy in this process of polishing is very great, and it serves no useful purpose from the point of view of modern aseptic and antiseptic technique. The question is largely one of appearance; " a smart appearance " is

the usual reason given. If that is the only reason, then a smart appearance is anything but artistic. If it is desired to sterilize the atmosphere and surfaces of the walls, etc., this may conveniently be done by means of formalin vapour.

It is unnecessary to have glass shelving for the theatre furniture. Wood or sheet steel, aluminium-painted, are equally good and are not liable to breakage in transit. As already mentioned the castors of all the movable furniture should be ball-bearing which is not the case with the furniture supplied. The metal instrument cabinets supplied are not air-tight and the contents readily perish if not vaselined. A well-made wooden case with rebate round the door is absolutely air-tight. If such a case is painted or thickly French-polished inside and outside it withstands the atmosphere of an operation theatre well and does not warp. The cost is one-third that of the metal kind. Any large firm of shop or show case makers supply such cases more especially to jewellers. In several instances, although not in our case, the glass fronts of the instrument cases sent out were found to have been smashed in lines which radiated from the handle, owing to the latter not having been removed before despatch and to its jolting against the side of the packing case. Similarly the gauges and glasses of the high-pressure sterilizers were broken in the same way.

The sterilizing for the theatre and wards is carried out in the sterilizing-room. Large pattern Primus stoves should be provided instead of small ones and nipple keys for all such stoves should be obtainable whereby a considerable amount of inconvenience and expense would be saved. In practice it saves a great

deal of time and fuel if all the sterilizing for the day is done in one batch in the large hospital disinfector.

The following additional articles should be included in the operation block equipment:

2 clocks, one for each theatre.
2 wall thermometers, one for each theatre.
1 dry-cell headlight (Down Bros., No. 4628), and 6 refills for same.
1 binaural stethoscope.
1 roller for roller towel.
2 safety razors with 3 dozen spare blades for each.
1 Worth's buff razor strop, medium size (351, Oxford Street, London, W.).
1 small stool for walking patients to step on in mounting the operation-table.
1 pelvic prop.
2 bottles of Horsley's aseptic wax (Down Bros., No. 669).
3 rubber caps, large size (Down Bros., No. 2072*a*).
3 glass flasks for boiling novocain solution.
The safe surgical sponge (Down Bros., No. 5765): 10 in. × 10 in., 6 dozen; 14 in. × 14 in., 12 dozen.
1 wringer with rubber rolls, say 12 inch.
2 flat irons with protectors.
1 mirror, say 10 in. × 8 in.
1 slate and pencil and sponge.
2 wooden rolls for storing mackintoshes.
1 sewing-box.
1 blotting-pad.
1 arm-board for use with operation-tables (Grey Turner's or almost any other pattern).
1 carborundum slip No. 89 for sharpening hypodermic needles.
2 emery pads for brightening needles.
2 sets of attachable elbows for water-taps, and two rose sprays for the taps.
1 small table, 1 camp-stool, and 1 folding chair, for sister's bunk.

X-Ray Department.

The X-ray outfit supplied to a general hospital in the field is adequate for most of the work it is intended for. Occasionally a case crops up in which the information sought for cannot be given owing to the low power and small size of the coil—*e.g.*, a case G.S.W. of spine where it is essential to determine the condition of the bones by means of a lateral view.

Of the apparatus itself, the mercury break (Butts') is not the best possible, although with certain alterations in the pattern it could be made more efficient. The dippers become corroded by the mercury and so far spares have not been available for replacement. The corrosion results in only a portion of the current being available and produces a flicker in the tube. A Watsons' break could be substituted for Butts'. The table or couch could be greatly improved by arranging an ordinary stretcher in place of the top of the table. The stretcher would be supported by four corner crutches with one crutch midway along each side. This arrangement would often avoid the necessity for moving a badly wounded patient from the carrying stretcher on to the X-ray table and back again. An additional X-ray outfit is supplied for use in the wards but it is difficult to wheel it about over the comparatively rough ground which exists in some camps. This part of the outfit could be materially improved in this respect.

The Mackenzie Davidson cross-thread localizer is sufficient for most purposes. It is unnecessary to supply a Winch direct reading localizer as well. The apparatus supplied for the localization of foreign bodies in the eye is sufficient for the purpose.

An important point is that the tube-box is not ray-proof so that the operator and others viewing the screen or standing near while X-ray photographs are being taken are apt to be affected by secondary rays and any unexposed plates may be fogged. The tube-box should be lined with thin sheet lead.

In concluding this brief criticism of the surgical section it should be mentioned that, on the grounds of efficiency, any change in the personnel of the medical officers, unless asked for by the officer in charge of the division, is to be deprecated; and secondly that the appointment of at least one officer well versed in the administration of anæsthetics in general surgical work is, as regards the question of operation, second only to the appointment of the operator and is frequently of greater importance. He should hold Major rank and receive additional pay as a specialist.

Scale of Equipment of a Surgical Ward holding Twenty-six Beds.

Articles.	*No.*	*Articles.*	*No.*
Baskets, bottle	2	Measures, glass, 4 ounce ..	1
Boards, inventory	1	,, ,, 2 ounce ..	2
,, bed-heads	26	Screens with cover	1
,, knife	1	Tables, bedside (*i.e.*, lockers)	26
Brushes, bedpan	2	,, pedestal	2
,, feeders	4	Trays, dinner	2
,, scrubbing, hand ..	2	,, diet, 10 tins ..	2
,, sweeping, long ..	2	,, soap	2
Chairs, arm, folding, H.P. ..	1	Tumblers, ½ pint	4
Feeders	4	Urinals, glass	4
Glasses, looking	2	Warmers, stomach ..	2
Inhalers	1	Forms, dining-room ..	2

Articles.	*No.*
Stools, camp	2
,, close, F.A.	2
Tables, portable, F.S. ..	2
Thermometers, clinical ..	3
Nutrient enema apparatus	1
Instrument sterilizer ..	1
Tourniquets..	2
Jars for dressings	1
Hypodermic cases	1
Basins, enamelled, 14 inch	4
,, ,, $7\frac{1}{4} \times 5\frac{3}{4}$ in.	4
,, ,, 6 inch ..	26
Bowls, shaving	1
Boxes, dressing	1
Cans, 3 gallon, and lid ..	2
Castors, pepper	2
Corkscrews	1
Covers, tin, $6\frac{1}{4}$ inch ..	13
,, ,, 4 inch	13
Cups, egg	6
Dishes, butter	26
Forks, dinner	26
Kettles, tea, 2 quart ..	2
Knives, dinner	26
Tin-opener	1
Spoons	26
,, tea	2
Pails, slop, and lid	2
,, iron, galvanized, 3 gal.	2
Pannikin, pint, enamelled..	26
Pan, bed, enamelled ..	4
Plates, dinner	26
Pots, mustard	2
,, tea	1
Salt-cellars	2
Scissors, haircutting ..	1
Basins, kidney, enamelled, 10 inch	1
Higginson's syringe ..	2
Irrigators	1

Articles.	*No.*
Dredgers	1
Stands, urine, for every 78 beds	1
Forceps dissection	2
Scissors, nail	1
Cloths, bedpan cover ..	2
,, medicine	2
,, table	2
,, tea	2
Dusters	2
Towels, hand	2
,, round	2
,, Turkish	2
Curtains, mosquito ..	26
Brushes, shaving	1
Tapes, measuring	1
Whisks, fly	26
Traps, fly	6
Shirts, cotton	6
Blankets, G.S.	78
Bolsters, H.P.	26
Cases, slip, bolster	26
,, ,, mattress ..	26
,, ,, pillow	45
Counterpanes	26
Mattresses	26
Pillows, feather	13
,, hair, large	26
Sheets, H.P.	58
Bedsteads, folding	26
Sterilizer instrument with lamp	1
Basins, kidney, enamelled, 8 inch	1
Rubber catheters, size 8 ..	2
Ward dressing case ..	1
Gloves, dressing, I.R. ..	6
Tapes, measuring, on requisition	
Razors	1

A recent addition of a second screen with cover has been made.

To the above scale of equipment there should be added:

Articles.	*No.*
Bed pulleys	26*
Dressing trolly	1
Screens with covers ..	3
Clock	1
Razor	1
Worth's buff razor strop, medium size (351, Oxford Street, London, W.) ..	1
Stomach warmers with covers	4
Penny tape measure ..	1
Bed tables, to stand on the bed	8
Electric standard lamps ..	3
,, fans	3
Sets of dressing instruments, complete	4
Stitch scissors	1
Forceps for removing instruments from sterilizer ..	1
Hot-water bottles with covers	8
Flat iron with protector ..	2

Articles.	*No.*
Resection trays (one 16 in. × 13 in. × 12 in., one 14½ in × 10 in. × 1½ in.)	2
Soutar's saline infusion apparatus	1
Roller for roller towels ..	1
Wheel-chair	1
Gowns for medical officer and orderly	4
Iodine spray producer ..	1
Sets of movable shelving, 4 ft. 6 in. × 4 ft. 6 in. × 12 in., comprising four shelves in addition to the top of the stand	3
Linen press, 4 ft. 6 in. × 4 ft. 6 in. × 12 in., comprising four shelves in addition to the top of the stand ..	1
Medicine cupboard with lock-up poison locker	1

Note.—It is clear that the proposed shelving mentioned in connection with the surgical store would answer the purpose for such ward fittings thus reducing the number of patterns of such shelving in the unit. It would also answer for the operation theatre fittings.

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* A smaller number of pulleys (say 8) would answer the purpose if the pattern were a detachable one.

CAMP SANITATION

By Captain ROBERT RICHARDS, M.D., D.P.H., R.A.M.C. (T.F.)

In modern warfare, one of the most striking features, even to the casual onlooker, is the extent to which Science has been called upon to contribute her share in assisting an army to achieve its first aim and object, the killing or disabling of as many of the enemy as possible. Less obvious, but none the less important, has been her contribution to that other side of warfare which seeks to check the wastage of manhood, inseparable from all wars, not only on the positive side in the actual saving of life and limb as a result of the most recent research and experiments of medicine and surgery, but also on the negative side in the domain of preventive medicine, by preserving the health and efficiency of the services to an extent hitherto unattained even under peace conditions. That this result has been attained in a war for which we as a people were unprepared makes the achievement more noteworthy.

In the actual field of operations, and on the lines of communication, the application of the science and art of preventive medicine has had fullest scope and most striking success; but the results have been as notable in camps, billets, and hospitals, both at the foreign and home base. Necessarily, the firing zone, the lines of communication, and the base, present certain sanitary

difficulties in common, and others peculiarly their own, and the means of overcoming these difficulties vary with the circumstances in each case. In the present chapter an attempt is made to indicate by a few notes the methods adopted to meet the special sanitary problems presented by a general hospital at the base or on the lines of communication. Exhaustive treatment of the subject has not been our aim, and alternative methods are not as a rule mentioned, stress being laid on one method which in practice has been found to give satisfaction.

When a general hospital is within two to three days of the home base, and rapid evacuation in emergency is thus possible, as in France, the unit may be regarded as a fixed one of 1,040 beds; but when the home base is distant nine to ten days or more, the hospital may suddenly be called upon to deal with such heavy casualties or excessive sickness that it should be capable of rapid expansion up to 2,000 beds if necessary. Consequently, the sanitary arrangements of such a hospital must likewise be sufficiently elastic to deal with such an expansion efficiently and immediately, as it is during such emergency that, with an overworked personnel and staff, sanitary arrangements which run smoothly for ordinary hospital routine are strained to their utmost, and where failure to stand the strain invites disaster.

The site of a general hospital must be such that transport is easy and rapid, and where supplies are readily available, as on a railway or within reach of motor transport. Frequently a site is chosen at a railway junction or near a large town or port, and in such cases permanent buildings may be adapted to

serve as a hospital, with possibility of expansion by canvas. In other cases the hospital may be entirely under canvas, with possibilities of expansion limited only by available ground space; and in yet others it may be accommodated in semi-permanent hutted buildings up to establishment, expanding where necessary by canvas, as has been frequently the case in the present war. All these types demand special consideration by the camp sanitarian, but the third may be taken as sufficiently representative for descriptive notes on sanitary considerations, with the addition, where required, of further notes peculiarly applicable to either of the others.

General Plan of a Hospital Camp.

For the best results in camp sanitation, it is of prime importance that, when the camp is planned, the sanitary aspect is kept continually in the forefront. Three points in particular demand attention.

First, the kitchen and stores must be so placed as to lend ready access for transport vehicles, and at the same time be centrally situated for ease in food distribution. There must also be convenient means of egress from these buildings to the refuse destructors.

Secondly, all refuse destructors, disinfectors, sluice-rooms, steeping tents for infectious linen, and other undesirable but necessary adjuncts of the camp, should be placed in an area by themselves, "the sanitary area," on the outskirts of the camp, where the prevailing winds carry smoke away from the hospital buildings. In the large hutted hospitals now in use, where a large area of ground is enclosed, this ideal is

impracticable, necessitating as it does the carrying of refuse from one corner of the camp to the diagonally opposite one, both a waste of time and labour and an offence in the camp. It is advisable, therefore, in such cases to have one refuse destructor at the opposite side of the camp to this sanitary area, on a site relative to huts and tents and prevailing winds where possible nuisance is reduced to a minimum.

Thirdly, the infectious area or wards set apart for infectious cases, especially those with infective intestinal diseases, must be adjacent to the "sanitary area," separated by a considerable interval from the ordinary medical wards, and having separate latrine accommodation.

To attain these ends, the plan of a hospital camp detailed in a previous chapter (Plate I.) may be considered as nearly perfect as possible. Here the main road runs up the centre of the camp past the stores and hospital kitchen, doubles round the administration block, and, after circling one half of the camp, passes through the sanitary area to rejoin the main road. This provides ready approach not only for stores and kitchen, and for the admission and discharge rooms and offices, but also a separate exit from the camp for the sanitary area, so that refuse carts need not traverse the general camp area. A refuse destructor of a closed type serves the needs of the opposite half of the camp, while on this side, too, space is reserved for necessary extension by marquees. The infectious diseases wards adjoin the sanitary area.

A. Conservancy.

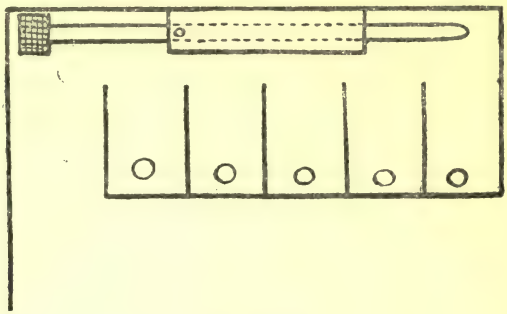
Disposal of Sullage Water.—In semi-permanent hutted buildings the disposal of sullage water, one of the most serious difficulties in camp sanitation, is a comparatively easy matter, as in such hospitals some system of drainage is as a rule laid down, sufficient at least for the removal of liquids. Drainage in such circumstances may be into city sewers, into the sea, or, after treatment by irrigation, into a convenient stream; and the duties of the sanitary squad consist in the daily inspection and cleansing of traps, and the prevention of chokages with grease by careful attention to grease traps, a matter dealt with subsequently.

In tented hospitals, however, the problem is often one of extreme difficulty, especially where the soil is of an impermeable character, or where there is no available outflow such as the sea, or a river which is not used lower down its course as a water-supply. Where such outlet exists, well-kept channel drains can with care be kept quite inoffensive with suitable grease trapping, even in warm weather. Failing such outlet, however, recourse must be had to sump-pits. These should be as far as possible on the limits of the camp, and on a downward slope to allow of soakage away from the camp site. The pits may be of any size and depth, and are most easily made by digging to the required depth, and filling in the pit with old burnt tins and stones to within a foot of the surface, the top foot being filled in with earth. To aid absorption, several short side-drains may be cut from the sides of the pit, with agricultural drain-pipes inserted. Waste

water may be led straight into such pits by ordinary channel drains from kitchens and ablution tents, provided efficient grease traps have been provided. It is convenient, however, to have also over the top of the pits an elevated box arrangement with a cover, 2 feet square, penetrating through the earth into the pit itself, through which water in pails or footbaths may be poured straight into the pit. In porous soil such a pit will last a long time, but sooner or later it will tend to be clogged. This condition is remedied by making further pits alongside, or by having two or three pits used week about, or arranging them in series, with agricultural pipe drains near the top of the pits connecting one with the other. Such pits require careful attention, and entail much labour in making and in working, but can be utilized when occasion demands them, with very good results.

Disposal of Fæces, Urine, and Camp Refuse.—Fæces have as a rule to be disposed of by incineration, as only in very rare instances can a water-carriage system be adopted. A sufficiency of latrines is essential (1) for the staff and personnel, and (2) for patients. The site of these must be chosen with a view to reducing nuisance to the least possible degree, and reference to the plan above shows how this can most readily be attained. Accommodation should be provided for at least 7 per cent. of beds, while on the side of the camp where extension is provided for this should be increased to 10 per cent., to avoid the necessity of utilizing tentage or improvised shelters for latrine purposes. The simplest type of latrine is a roofed corrugated iron shed, laid down as in the accompanying sketch plan A, with the necessary number of recesses. It should have a

cement floor with a gutter running the whole length to a gully at one end, preferably with a water tap over it. For the reception of fæces, oil-drums with one end chiselled off, and fitted with circular seats, each provided with a well-fitting lid, provide at once the simplest and most readily obtainable receptacles. These are at once portable, easily cleansed, and fly-proof. If desired, hinged lids, where hinges are available, may be provided for the seats, a simple adjustment at the back making these, when opened, to be just short of the perpendicular, so that the lid closes automatically when not in use.



SKETCH A.

The great objection to these is that in warm countries, as in the Mediterranean area, wood shrinks very rapidly, and hinged lids speedily cease to be close-fitting. Ordinary circular lids with a fairly wide flange and a plain, readily cleansed handle maintain a fly-proof condition indefinitely, provided they are always replaced. There are thus objections to both, and choice will depend on the materials at hand, and on the personal inclination of the sanitary officer. For urinals in the latrines two or three oil-drums may be used, or a urinal may be constructed in the form of a trough of thin

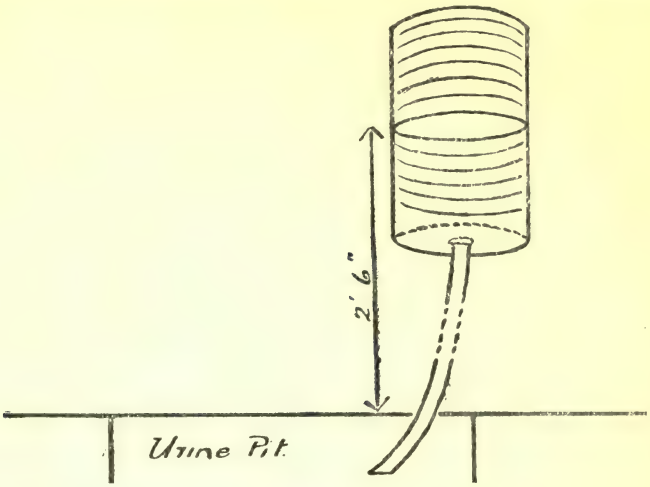
metal placed 2 feet 6 inches above the gutter in the latrine, 6 feet long, 1 foot broad, and 8 inches deep, draining by a pipe at one end into the gutter.

Such latrines serve equally well for staff, personnel, and patients, and also for nurses. In a hutted hospital, however, the nursing staff are usually accommodated in huts, and a special hut may be set apart for sanitary purposes. The simplest type is a hut with a central passage running lengthwise, off which on one side open small latrine recesses for bucket latrines, and on the other larger recesses with baths, connected by piping with a hot-water boiler and furnace at one end.

When a general hospital is entirely under canvas, special canvas erections or tents must be provided as latrines. These, however, are best planned in a similar way to the latrines already described. If no drainage is available, a certain number of oil-drum buckets serve as urinals in these, or special urinals may be constructed if the soil is suitable. Oil-drums are cut as in the sketch shown (B), with a pipe connection leading into a urine pit. Such pits should be 4 feet square, dug to a depth of 5 feet, and filled in with old burnt tins and stones to within 1 foot of the surface, the top foot being filled with sand. The pipes lead into the stones. As such urinals are often made use of as handy receptacles for odd refuse, such as cigarette ends, matches, tobacco tins, etc., which tend to choke the pipe outlet, they should be filled up with fairly large stones, frequently renewed.

When latrines of the above type are in use, there remains the problem of the regular cleansing of the latrines and of the final disposal of the fæces. Here the sanitary squad come into play, whose numbers and

duties are detailed below. The buckets as a rule, and certainly in hot weather, must be emptied and cleansed twice daily, between nine and ten in the morning and four and five in the afternoon being suitable times. The best method is to have a duplicate set of buckets, a clean set being brought up by the sanitary squad to replace those being removed. The seats and lids should be scrubbed at least once daily with 1 per cent. cresol, the floor sluiced and swept down with the same

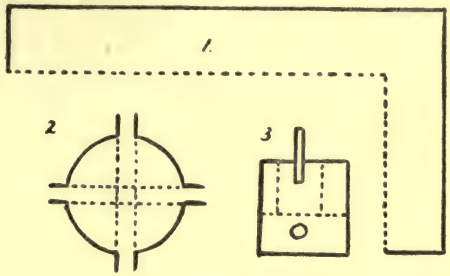


SKETCH B.

solution, and the drain and gully cleaned. The U-shaped urinal is best cleansed by flushing with water and painting the interior with strong cresol. The buckets, provided with some cover such as scrap tin sheeting, are removed at once to the refuse destructors in the sanitary area, whither also all other kitchen and camp refuse is removed in covered bins.

For a general hospital, two closed incinerators, Horsfall's, or metal-lined brick incinerators of the

Horsfall shape, one at each side of the camp, are sufficient for the destruction of the fæces and part of the general refuse. In addition, for general refuse, an open circular incinerator, made of clay and ashes, of the ordinary type, should be built in the sanitary area. These can easily be built with material at hand in a couple of days; they cost nothing, last for months, are very efficient and readily replaced. Round these incinerators, a corrugated iron shed, closed towards the camp and open towards the incinerators, should be run



SKETCH C.

1. Shed open towards incinerators and closed towards camp.
2. Open incinerator of clay and ashes built over cross-trenches.
3. Horsfall incinerator.

up in the form of a right angle (sketch C). This ought to have a cement floor. The shed serves for the reception of all refuse, and in stormy weather protects the workers, keeps the refuse dry, and prevents it being blown about the camp. All dry refuse is kept, so far as possible, by itself, and this with the wet refuse is collected before burning, in covered bins or oil-drums. The dry refuse is used for mixing with the fæces before incineration, and is supplemented by sawdust drawn from the nearest R.E. base depot. The fæces are prepared for incineration as follows: Into an oil-drum

coated inside with a thin layer of heavy oil or cresol is placed about 3 inches of sawdust or dry refuse, then 2 to 3 inches of fæcal material, then another layer of sawdust, and so on, till the bucket is nearly full, when it is finally covered with sawdust; and when a good hot fire has been obtained in the incinerator, with ordinary easily combustible refuse, this is dumped on the top. The empty buckets are rinsed with a small amount of water by means of a handled mop, this water being added to the next bucket of prepared fæces, and are then coated inside with a thin layer of heavy oil. This serves two purposes: it prevents flies congregating round the buckets, and it makes them empty clean after use. The cleansed and oiled buckets are stacked one above the other outside the shed till required the next time the latrines want attention.

The ordinary kitchen and ward refuse not used for starting the Horsfall or mixing with fæces is burned in the open incinerator, which is particularly useful for burning the empty meat and milk tins, which bulk largely in hospital refuse. In this way, if a supply of sawdust is available, all the refuse from a general hospital may be burned daily. Without this supply it is often impossible to burn all the wet refuse, and a certain proportion of the fluids may have to be strained off and removed by Crawley cart to the nearest dump. With a good drainage system this fluid may be discharged into the drains, but failing such a system and a convenient dump the fluid may have to be boiled. Suitable boilers for this purpose can be made out of the large 160 gallon metal petrol barrels, cut in half, and placed over an improvised fireplace near the incinerators. After boiling the solid matter is allowed

to settle, and the fluids removed by large dippers, to escape by a drain, or discharged into a large soakage pit. Every few days the solid matter must be removed and burned.

The above-described method suffices for the fæces from the latrines of the staff and personnel, and of the ordinary surgical and medical patients; but special precautions are advisable in the case of excretions from patients suffering from infective intestinal disease, which bulks largely in the sickness incidence in certain theatres of war. As already indicated, a special block of wards is set apart for the treatment of such cases near the sanitary area, attached to which is a special set of latrines for such patients as are able to get out of bed to use them, these being immediately adjoining the incinerators. The excreta from these latrines must all be burned, no fluid being at any time drained off. Special buckets and seats are reserved solely for these latrines. Otherwise the method of disposal is the same as in other cases. The cleansing of bedpans and urinals from bed patients in these wards demands precautions and rules which must be rigidly enforced if cross-infections in the wards and infection of the staff are to be avoided. For this purpose a small shed with cement floor, with water-supply and drainage, ought to be built, and if there is sufficient supply and head of water a regular sluice sink may be installed, but is not absolutely necessary. This shed must be fly-proof, well ventilated, and close to the wards. In it provision should be made (1) of a bucket or buckets with well-fitting covers, to receive the fæces; (2) of a large bath of cresol (2½ per cent.) in which to steep bedpans, with a handled mop in the cresol bath; (3) a

rack for bedpans. The orderly brings the bedpan from the ward to this shed and empties it into the bucket, replacing the lid. He next rinses the pan under the water-tap, the rinsing water being directed immediately into the drain if the drainage is safe for such a procedure; but if not, it is received into a large bath with 5 per cent. cresol. He then transfers the pan to the bath of cresol, cleanses it thoroughly with the mop, and leaves it to steep in the bath, taking a clean bedpan from a rack back to the ward. The next orderly coming from the ward first removes from the cresol bath the bedpan left by the previous orderly, rinses it with clean water to remove excess of cresol, and places it in the rack, afterwards repeating the process carried out by the first orderly. Where a shed is not available, the same procedure can be carried out in a modified way in a small tent, the necessary articles being a bucket with cover, two baths of cresol with a mop in one of them, a pail or bath of clean water with a dipper (a cigarette tin with a wooden handle answers quite well), and a box to store the bedpan. The only difference in working is that the orderly first rinses the bedpan with clean water by means of the dipper over the first cresol bath, thus keeping the water clean so long as it lasts, then transfers the pan to the second cresol bath, where it is cleansed with the mop and left to steep as before. Such a shed or tent must, of course, be kept scrupulously clean; two or three fresh mops (odd pieces of cloth or tow tied to a stick are all that is necessary) must be available daily, the soiled ones being immediately burned. The bucket should be removed and emptied two-hourly by the incinerator attendant, who is also responsible for keeping the baths full of cresol

and maintaining the supply of fresh water. The contents of the cresol bath after an hour can quite safely be poured down a drain, or, when this is not available, treated in the same way as excess fluid from latrine buckets described above.

The necessity for constant care on the part of orderlies as to personal cleanliness, in carrying out this process, needs to be constantly emphasized. Even when the risk of infection has been repeatedly pointed out, one finds that orderlies speedily grow careless and omit to carry out some of the rules laid down. The following rules drawn up for orderlies in attendance on patients with "enterica" in a marquee in a hospital in the Mediterranean area indicate the points requiring emphasis:

RULES FOR DISINFECTION IN ENTERIC WARDS.

Stools.—To be burnt immediately in incinerator; the bedpan is then to be brought back to the tent annexe, cleaned with cresol solution, care being taken that no particle of fæcal matter remains on pan or lid, and allowed to remain in cresol solution till again required, when it is rinsed with clean water to remove the cresol before use.

Rubber gloves will be worn by the orderly during this process. The gloves must be washed in weak lysol solution, and allowed to remain in the same solution till next required, when they are first rinsed with water.

On no account will the patient handle his own bedpan.

Urine.—An equal bulk of cresol solution will be added to the urine, and allowed to stand for twenty minutes before being emptied into the latrine.

Linen.—To be conveyed in a covered receptacle to the steeping tent, and immediately steeped by the orderly in a bath of cresol solution provided for the purpose, care being taken that every article is completely covered. Sheets and underclothing must never be left lying on the ward or tent floor.

Hands.—After attending to the patient, the hands must be scrubbed with a nail-brush in cresol solution, and then washed with soap and water. Special attention will be paid to the nails. This procedure must be carried out also immediately before handling food, either for the patient or for oneself.

Overall.—Will always be worn by the orderly on duty. This will be taken off before he goes to any other part of the hospital, and hung in the tent annexe.

Utensils.—Great care will be exercised to keep food and food utensils free from the possibility of infection. Food utensils requiring washing must on no account be taken into the sanitary annexe.

Surprise visits by the sanitary officer to sluice sheds and latrine tents at odd hours of the day, in addition to routine daily inspection, are absolutely essential as a check on carelessness and neglect on the part of attendants.

B. Water-Supply.

Adequacy of Supply for a General Hospital.—The site chosen for a general hospital must be one where an adequate supply of water is available for the needs of patients and personnel for drinking, cooking, baths, laundry, general cleansing purposes, and fire extinction; and one must briefly consider what constitutes an adequate supply for such a hospital. It must be remembered that the consumption of water in such a hospital is subject to considerable variations. The bathing of patients on admission is perhaps the most expensive item in the water consumption, and the frequency of arrival of convoys determines largely whether any given water-supply suffices for the needs of a hospital without recourse to the expedient of water-rationing. Another point is that, in hospitals where surface drainage has to be resorted to, an abundant

supply of water is not an unmixed blessing, as the necessity then arises for dealing with a large amount of sullage water, a problem never easy to solve, and in certain places, owing to the site of the camp and the local geological conditions, sometimes exceedingly difficult. Further, if the hospital is to be capable of rapid extension—and this, under certain conditions, has been shown to be a necessity—the water-supply must be sufficiently abundant to meet this extension, though here it is possible, by careful rationing, to make a supply which adequately serves 1,500 persons suffice for the needs of 2,000 for considerable periods, without detriment to the general health of the camp or loss of efficiency in the hospital.

Coming to actual figures, one finds that in standing camps for ordinary units the standard laid down is 5 gallons per head, so that for hospitals a larger amount would be necessary. For drinking and cooking purposes at least 1 gallon per head is required, and in warm countries this amount will not suffice. For a bath 6 gallons is necessary; but this is very wasteful, as, by means of sprays which can be easily and cheaply fitted up, as good results can be obtained with 1½ to 2 gallons. For sponge-bathing a bed patient 1 gallon will suffice, so that a convoy of 200 patients of equal numbers of sitting and lying cases can be bathed with 250 to 300 gallons of water. If spray baths are fitted up for the personnel, the same amount will be necessary for their personal ablution, with 2 gallons per head for officers and nursing staff. There remains the water for personal ablution of patients already in hospital, many of whom require sponge baths or partial sponge baths daily, or more often, so that 2 gallons per head

must be allowed for this purpose. For general cleansing and sanitation 1 gallon per head, and for laundry, if this is carried out within the hospital, 2 gallons per head, are required. Thus, taking a mean of 1,500 patients and staff, the *minimum* requirements are—

For drinking and cooking ..	1 gallon per head	= 1,500	gallons.
„ personal ablution ..	2 gallons „	= 3,000	„
„ general cleansing and sanitation	1 gallon „	= 1,500	„
„ laundry	2 gallons „	= 3,000	„

Or a total of 9,000 gallons per day. With careful attention and constant watchfulness on the part of the sanitary squad to prevent waste, this might be slightly reduced; but much less than this amount as a minimum would materially impair the efficiency of the hospital, and in times of stress, with frequent convoys arriving, this amount would certainly be exceeded.

Storage and Supply of Water.—Unless one is so exceptionally placed that the water comes from a main with adequate water-supply, there must be a reservoir or tanks for water storage. These ought to be within the hospital area for ease of protection. Storage is necessary to cope with exceptional pressure of work in hospital, to provide for the danger of fire, and to guarantee a supply during the temporary breakdown of pumps or of accident to the supply pipes. In addition there ought to be for fire extinction purposes a certain amount of water storage throughout the whole camp area. This can be done either by having old pattern water-carts at fixed points, which could be run quickly to the site of any outbreak of fire, or by having oil-drums of water to each hut and marquee, to the extent of four oil-drums to each hut, two to each

marquee, and one to every four bell tents. The water in these buckets must be renewed at intervals, and, if in a mosquito area, treated weekly with kerosene to prevent the breeding of these pests. The reservoir or tanks ought to be in two separate sections, so that for emergency one half may be kept full as a reserve, water being drawn for ordinary purposes from the other section. From this storage reservoir pipes are laid on to huts and marquees as necessary, a complete water-supply system on a small scale being installed. This, however, with the provision of the reservoir, is purely an R.E. matter.

Drinking Water.—It may be laid down that in every instance, except where the water comes off the main of a pure city supply, the water used for drinking purposes will have to be purified by some means before use. In cooking, the water is rendered safe by being boiled. For drinking purposes there are two possible methods of purification: (1) Boiling, and (2) chemical purification by chlorination. Boiling is the method of choice, but is costly from the amount of fuel necessary. The simplest way to carry this out is to have a series of Soyer's stoves for boiling the water, the water being stored till cool in a corresponding series of galvanized iron tanks set up alongside, each provided with a tightly fitting lid, and with a tap for drawing off the water. Where fuel is not available this method cannot be adopted, and chlorination must be resorted to. One part per million of available chlorine is sufficient to kill off the organisms of the infective intestinal diseases, if the water is first filtered to remove the suspended solids. A convenient method of carrying out the chlorination is to use the water-carts which are provided

in the equipment of a general hospital, filling these from the reservoir with filtered water by means of the pumps and filters attached to the carts, and chlorinating in the carts. Water can be then drawn off from the taps, or the carts may be drawn to suitable points in the camp for distribution. Full details of the method of chlorination are unnecessary here, but to insure a good result it is essential that the bleaching-powder used to provide the chlorine must be fresh, and it must first be rubbed up into a paste with a little water, this paste being then mixed with a pailful of water, which is added to the carts with thorough stirring of the water while this is being done. Half an hour must elapse before the water is drawn. If only one part per million is added, the taste imparted to the water is slight, and speedily disappears on exposure to air, but it may be entirely removed by the addition of a trace of hyposulphite of soda. The whole process is simple, and, if controlled occasionally, can easily be carried out by a water orderly.

Rationing of Water.—When the water-supply to a hospital is just enough or barely enough for ordinary requirements, this procedure must be carried out as a routine. Even when the supply is ordinarily in excess of requirements, it may be necessary, as after a long spell of drought, or when a breakdown in pumping has occurred, or when, owing to breakdown elsewhere, a supply may have to be given to other units in the neighbourhood. The extent to which this rather undesirable means of safeguarding the supply has to be resorted to varies with the local circumstances, but it may sometimes be necessary to reduce the ration to drinking and cooking water only. To facilitate this

it is well, as stated above, to have the reservoir of water in two sections, one of which is shut off from the delivery pipes, but open to the supply pipes till brimful. Such a reserve is of great value in the event of a breakdown, and invaluable in the event of fire. For drinking water, the ration allowance can be drawn off into carts or small tanks in the morning; and for cooking, the kitchen supply may be turned on for one hour in the morning, at midday, and in the evening, to allow sufficient to be drawn for meals and the minimum of washing up necessary. If less stringent rationing is necessary, the supply pipes for the whole hospital may be opened for two hours in the morning, then closed till midday and other two hours' supply allowed.

Notices should be posted in the wards and kitchens stating the hours of supply, to permit the drawing into baths and pails during these hours of the minimum amount required to enable them to carry on; no ward having sufficient receptacles available to store more than this amount, wastage is thus prevented.

A daily inspection of water taps and supply pipes should be made always, but is especially urgent when there is any shortage of water, as wastage from defective taps or leaking joints may be very considerable.

C. Food-Supply.

The Hospital Kitchen.—The site of the kitchen, as already indicated, is one of the first points to be decided in laying out the camp. It must be central and have ready access to the main road for supplies; it must be removed from all camp nuisances, such as latrines and

incinerators; and it must at the same time have a direct path from it to the sanitary area for rapid removal of all refuse.

The general plan of the kitchen must also be laid down with a view to ease in working—*e.g.*, with all ranges and boilers in the centre; general stores, meat store and butcher's shop, and scullery, at one end, and distributing-room at the other. The sketch plan (II.) shows how this is readily obtainable in a hutted hospital.

The central part, containing ranges and boilers, is narrow, and has cross-ventilation to keep it as cool as possible. All windows and ventilators are covered with fly-proof wire gauze. The floor is of cement, and, so far as possible, the main cooking ranges are kept to the middle of the room, so that work can be carried out from both sides, and cleaning is rendered much easier. Additional boilers in the form of Soyer's stoves may be used to any number, these being set up outside in rows in close proximity to the kitchen.

The **Butchery Department** is within easy reach of the kitchen, preferably with free ventilation apart from it, thus maintaining a cooler temperature. This must also have a cement floor, with drainage to a gully in the outer wall. The bench must be sufficiently heavy for chopping, and should not be against a wall, but placed centrally to give greater working space and to make cleaning easier and more thorough.

The **Meat Store** should adjoin and open off the butcher's shop, or be a separate building, and be sufficiently large to have eight half-carcasses at any one time. The practice of having a combined butcher's shop and meat store cannot be recommended, as meat

is drawn on the day preceding that on which it is to be used, and this must hang in the shop while all preparations for that day are going on, hampering the workers by occupying so much space, and being constantly liable to infection from the clothes of workers and from splashings from the floor while this is being swilled.

The **Scullery** should be ample in size, open directly off the kitchen, have a cement floor with good drainage to a gully in one corner, and be provided with at least three large sinks. On the drain from the kitchen some special means of trapping the grease is necessary to prevent frequent chokage. A simple method of achieving this, either in a permanent closed drain or in an open drain, is described below.

The **Food Distribution Room** is best placed at the opposite end of the kitchen to the scullery and butcher's shop. It ought to be open throughout, almost to its whole extent, on to a stope, to insure rapid distribution of the food in a hot and palatable condition to the whole hospital, without an unseemly scramble for position amongst the orderlies from the various wards.

Food Inspection.—As it is essential that meat and other food rations served out are fit for human consumption, these should be examined by the sanitary officer daily on delivery; but, even given wholesome food, there are possibilities of contamination after delivery which must be guarded against. Absolute cleanliness in the kitchen is of highest importance. Strict rules, rigorously enforced, as to flushing out floors, scrubbing tables and benches, and maintaining a high standard of cleanliness in the building, equipment, and personnel, should be laid down. The best

arrangements will break down if this is not enforced in every detail; all butcher's-knives, choppers, and saws, all mincers, cooking tins, and utensils generally, must be kept scrupulously clean, and steeped or washed in boiling water and soda at least once daily; further, all washing and drying cloths must be washed and hung up to dry immediately after use, and a plentiful supply for renewals be kept ready at hand. Frequent inspection of the personnel is also essential, not only as regards cleanliness of hands, nails, and clothing, but also as regards general health. Every worker in the kitchen, and this applies also to all attendants in officers', sisters' and sergeants' messes and in canteens, should have orders to report at once any diarrhœal illness, and failure to do so, when detected, should be treated as a crime.

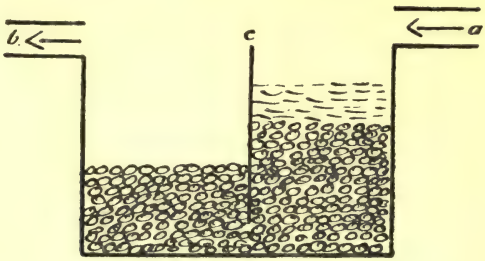
Kitchen Refuse and Sullage Water.—Material assistance from the sanitary point of view may be gained by special arrangements outside the kitchen itself. If possible, an area of cement, or failing this a prepared platform of stones, gravel, and sand, should be laid round the main doorway and round the scullery. The value of this lies in keeping the kitchen clean, especially in wet weather, and in providing a firmly made stance for the additional Soyer's stoves already mentioned, and for the closed refuse bins for the kitchen. A small lean-to shed at one corner of the kitchen for storing and preparing vegetables removes a frequent source of obnoxious odours outside the kitchen itself. All kitchen refuse is collected in closed galvanized iron bins ranged alongside the scullery, so far as possible separate bins, labelled, being used for wet and dry refuse, to aid incineration after removal. These bins are emptied

regularly, twice in the forenoon and once in the afternoon, and once daily at least are thoroughly scoured and the cement platform scrubbed down.

The sullage water from the kitchen, even when led into piped drains, is always a source of trouble if a proper grease tap, cleansed daily, is not inserted in the course of the drain about 20 yards from the kitchen. If placed at this distance, the grease dissolved in the hot water has to a great extent separated out by the time it reaches the trap, and can be readily separated and removed for burning. In a piped drain, a rectangular cement chamber in its course, 2 feet by 3 feet, and extending a foot below the level of the drain, with the outlet guarded by a narrow gauge grid, works very well. As an improvisation, however, either in a piped or open drain, the most efficient grease trap is one composed from below upwards of stones of graded size, with 3 inches of sand on the top. This works in practice sufficiently well if cleansed daily to render the effluent inoffensive even when running in open channels. Such a trap (sketch D) can readily be made from a wooden box 3 ft. $\times$ 2½ 2 ft. $\times$ ft. inserted in the course of the drain. A dividing partition (*c*) is inserted across the box, but short of the foot of it by 2½ feet. The half nearest the inflow (*a*) is filled up to within 6 inches of the top with graded stones, then covered with 3 inches of gravel and 3 inches of sand. The further half is filled half full of small stones only. The greasy water entering (*a*) has to pass through the sand, gravel, and stones, under the partition (*c*), and through the stones in the second chamber, before reaching the outlet (*b*), in its passage being freed of practically all the dissolved grease. Traps of more durable material on the same

principle can easily be made, and are specially useful in the field kitchens of a hospital under canvas.

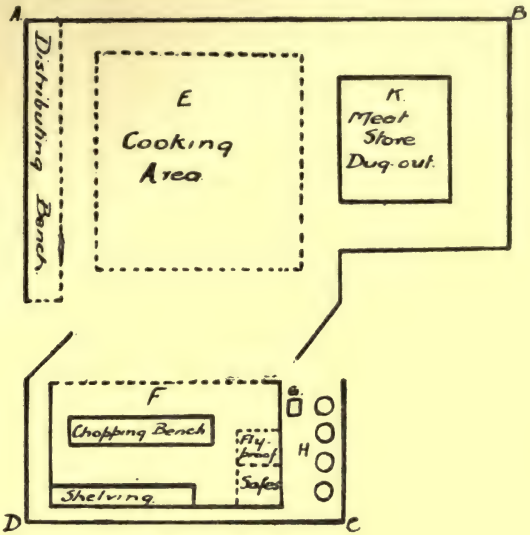
When a hospital is entirely under canvas, a kitchen will have to be improvised, and this can satisfactorily be carried out with a little care in planning. The site is chosen with the same regard to transport and supplies as in a hutted hospital. The whole kitchen area (sketch E) should be marked off and delimited by a low boundary wall or fence, within which only those directly concerned with the preparation or distribution of food are allowed. A meat store and a preparation-room are necessary. The most suitable meat store for



Sketch D.

all climates is one of the dugout variety close to the preparation-room. A large pit is dug, with steps leading down from one end. In this pit is built a shed with a roof just above ground-level, and projecting slightly over the edge of the pit, to direct water off the pit into suitable trenches surrounding it. The door should be made of fly-proof wire gauze. This store must be of sufficient size and height to permit of the hanging up of the number of half-carcasses received as rations. The preparation-room consists of a shed with three enclosed sides, with ample ventilation under the

eaves. The fourth side may be left open, or, better, may be closed by a light framework covered with fly-proof wire gauze, which in this case should also protect the ventilating openings under the eaves. A chopping bench, shelving, and fly-proof cupboards, complete the equipment in this room. The floor should be of cement and have a drain running to a gully outside, and the



SKETCH E.

ABCD, enclosed area; E, cooking area for ovens, etc.; F, preparation-room; G, grease trap; H, stance for refuse bins; K, dugout meat store.

drain must be efficiently grease-trapped as described above. The kitchen area must also include sufficient ground for a cooking area for Soyer's stoves, ovens, and dixies, which space may or may not be roofed over, and for a stance for refuse bins. Along one side of the wall or fence nearest the cookers a long bench should be built from which to carry out the food distribution.

This by preference is roofed, and is built close to the limiting wall, so that it is unnecessary for orderlies to enter the kitchen area to receive the food. The sanitary rules already laid down are equally applicable to this type of kitchen.

D. General Sanitary Considerations.

Scavenging.—From the sanitary as well as the æsthetic point of view, it is well to have certain of the sanitary squad on routine scavenging work for part of the day at least. This includes not only the scavenging of the camp, which is soon littered with paper, straw, cigarette boxes, etc., especially after wind, but also the collection of the refuse pails from the various wards, at a fixed hour in the morning, for dumping in the incinerator. With an overtaxed sanitary squad, it is a good plan to make ambulant patients, who are fit for it, do the scavenging round their own huts or marquees; it takes only a few minutes daily for two or three convalescent patients, and materially relieves the work of the regular sanitary personnel, and at the same time it has a good moral and physical effect on the patients and stimulates a healthy rivalry between wards.

Flies.—Attention to the general scavenging of the camp helps in keeping down flies, always a nuisance and danger in camp life. Every possible breeding-place for these pests within the camp area must be rooted out, and attention given to possible breeding-places in the vicinity, such as mule lines or refuse dumps. Such breeding-places without the camp should be at once reported to the specialist sanitary officer for the district, between whom and the camp sanitary officer there should be constant co-operation.

Mosquitoes.—In certain districts, especially in the Mediterranean area, special attention is necessary to prevent mosquito-breeding. All ditches and pools of standing water require thorough drainage, or, where this is impossible, to be treated regularly with kerosene, sanitas-okol, or cresol. Necessary standing water within the camp, as in fire buckets, must have routine treatment on these lines weekly, one day per week being fixed for the purpose to insure checking. In such districts the number of patients in hospital with malaria forms such an important possible source of infection that, even when mosquito nets are used, every possible breeding-place in the camp, however insignificant it may seem, must be sought out and treated.

Among the general sanitary points to be noted is the trenching of the ground round huts and tents, and alongside paths, to prevent collection of surface water. All paths and roadways should be raised above the general ground-level with stones, gravel, and sand, and have open trench drains on each side. Trenches should also be dug to surround huts and tents, and lead into main trenches to the outmost limit of the camp, while small wooden bridges should be made to carry side-paths to the wards over the open trenches. The first heavy rain is the best indicator of where trenches are required, and after such rains it will be necessary to have a certain number of men detailed to clear all trenches of silted sand, especially near bridges, where a single night's rain is more than sufficient to cause chokage and flooding.

Disinfection.—For infected linen and for patients' kits in a hospital of 1,040 beds, two Thresh disinfectors can be kept going steadily, where the evacuation of

patients is rapid. For extension above this number of beds a third is advisable. These should be stationed in the sanitary area, in a roofed open shed off which opens on one side a small room for infected linen, and on the other a corresponding room for disinfected articles before removal to the laundry. Small store tents, one on either side of the stance, for the disinfectors, answer the same purpose, and, while not so satisfactory as a shed, may be in a tented hospital all that is available. As a precaution, it is useful to have in the infectious linen room or tent several large baths filled with 2 per cent. cresol, to soak the linen from infectious wards before being handled by the disinfector attendants.

Personnel.—The numbers and composition of a sanitary squad in a general hospital differ with the country in which the unit is serving and with the local circumstances. When a hospital is running with all beds occupied, the numbers of the sanitary unit are curtailed to the minimum when the work is heaviest, owing to the drain on nursing and general duties orderlies. Under such circumstances it is often possible to obtain help from men who have been classed for "permanent base" duties. Further, in certain circumstances, especially in the Mediterranean area, it may be possible to get local labour for sanitary purposes under supervision by R.A.M.C. men. This has been the case in the Near East, where the hospitals have been situated in a country with which we are not at war, and which, not being itself at war, has a male population available for hire. Taking a hospital on the lines of the sketch plan previously detailed, where only R.A.M.C. or "permanent base" men are available,

the following personnel has been found necessary for sanitary duties:

One N.C.O. in charge.
Two men for incinerators.
Three men for latrines on medical and infectious side, and for latrines of officers and detachment.
Two men for latrines on surgical side, and for nurses' quarters.
Two men for removing kitchen refuse and ward refuse at routine hours.
One man as water orderly.
One man for disinfector, preferably with some engineering knowledge.

Many of these are available as well for general scavenging duties when routine work is finished.

The N.C.O. and men on water duty and in attendance on incinerators and disinfectors should be R.A.M.C. men; the others may be P.B. men if available. This personnel is a minimum. Where native labour is used, a larger number is required, as a native never gets through as much work as a soldier. In such a case it has been found necessary for 1,500 beds or under to have fifteen others in addition to the R.A.M.C. members of the sanitary squad.

CLERICAL DUTIES—THE FIELD MEDICAL CARD —A WARD DIET SUMMARY

Hon. Lieut. and Quartermaster S. TAYLOR, R.A.M.C.

The personnel of a general hospital is usually composed of men comparative strangers to each other before the formation of the unit, and it behoves the officers and warrant officers to make themselves acquainted with those under their command, and endeavour during the period of the voyage to sort out the men for the kind of employment most suited to them. For this purpose a nominal roll of the unit should be prepared in Army Book 136, showing all the particulars required for a record of services, which will prove of inestimable value for future reference. A personal interview with each N.C.O., and man too, with a few individual questions, soon gives an idea as to what the man is best suited for, and a note on the nominal roll greatly facilitates the placing of N.C.O.'s and men in the positions required on the opening up of the hospital.

Clerical.—It is important that the Chief Clerk should have a good knowledge of army routine, the preparation of returns and mode of correspondence, also the nomenclature of diseases. Although a Registrar is appointed, it is not improbable that he may be unacquainted with the clerical work of a hospital. The Chief Clerk, on arrival at the destination of the hospital, should without delay be sent to the headquarter offices of the depart-

FIELD MEDICAL CARD.

DIVISION. BRIGADE.

REGIMENT.

SQD'N, BATT'Y, OR CO'Y.

REGIMENTAL NO. RANK.

NAME.

REG. / S.R. / T.F. OR N.A.

AGE. SERVICE.

SERVICE IN COMMAND.

WOUND OR DISEASE.

INVENT. OF KIT.

RELIGION.

MEDICAL UNIT FROM WHICH TRANSFERRED.

WARD. DATE.

PLATE VI.

CONDITION (IF ANY) REQUIRING SPECIAL ATTENTION_____

_____

_____

_____

WARD DIET SUMMARY.

WARD _____ MONTH OF _____ 19

DATE	NUMBER OF PATIENTS IN WARD (in words)	DIETS (Number in figures)					EXTRAS (Number in figures)																		INITIALS OF MEDICAL OFFICER
		ORDINARY	CHICKEN	BEEF TEA	MILK	No. DIET	RICE PUDDING	SAGO PUDDING	TAPIOCA PUDDING	CUSTARDS	MILK ½A	BEEF TEA ½A	LEMONADE ½pt.	EGGS.	PORT. 4oz.	BRANDY 4oz.	ALE ½pt.	STOUT ½pt.							
1.																									
2.																									
3.																									
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29.																									
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31.																									
TOTALS																									

I CERTIFY THAT THE ABOVE NAMED DIETS AND EXTRAS WERE ORDERED BY ME FOR WARD _____ AND THAT THEY WERE NECESSARY

_____
Officer in charge of Ward

PLATE VII.

ment to learn how to prepare his table of returns, etc., specimens of which are contained in the S.O. for the R.A.M.C., Appendix 15.

Admission of Patients.—On the admission of patients, who generally arrive in convoys of large numbers, it is absolutely necessary to check and add to the particulars shown on the field medical card A.F. W 3118; otherwise one has not the necessary information for the admission and discharge book.

A.F. W 3118 is of little value on account of the scanty information it gives, and therefore a fresh docket is nearly always prepared, showing regiment, company, brigade, division, regimental number, rank, name, age, service, religion, and any other item peculiar to existing conditions.

This throws a great deal of work on the clerical staff, and delay in getting patients to wards, which could be obviated by A.F. W 3118 being revised (see specimen, Plate VI.), and a larger card would be further improvement.

The need for this revision is evident when it is remembered that most of the items mentioned are required by each medical unit the patient passes through.

Diet Sheets.—Diet sheets (A.F. I 1202) are prepared from the foregoing information, and more often than otherwise a medical case sheet (A.F. I 1237) and temperature chart (A.F. B 181). These three forms could, with great saving to the public, more compact information, and a higher state of efficiency, be combined in one (see specimen in notes of surgical specialist, Plate III.). A further economy could also be made by the institution of a Ward Diet Summary in place of A.F. F 734 (see specimen, Plate VII.).

At the present time a summary of diets is prepared from the diet sheets on A.F. F 734 (carbon process) in the wards by the nursing sisters. The summaries are entered into the steward's diet record and diet account, and the last-named is audited by comparison with the diet sheets (A.F. I 1202). This is obviously not correct, and checking an account by vouchers other than those which have been used to prepare it is not fair to the steward. If the suggested Ward Diet Summary is adopted, it would serve as a voucher for the steward's diet account, save clerical work to the medical officer, nursing sister, and steward, do away with an expensive form of book (A.F. F 734), be more simple and effective, and save the expense of providing wooden bed-head boards for each bed. It also would be more efficient for audit purposes.

The reduction of 25 per cent. on the ingredients for puddings mentioned in para. 60, Allowance Regulations, could be made applicable to wards; and if diets were issued in bulk, similar to the dining-room principle, the saving to the public might be considerable, and the heavy hospital equipment be reduced by leaving out diet tins and trays from the schedule.

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