MANAGEMENT OF A FIELD SURGICAL UNIT

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Much attention has been paid at discussions and in the journals to the purely operative side of forward surgery, but in our opinion the other side, which may be termed loosely the "running of the unit," has been somewhat neglected. When taking a new Field Surgical Unit into the forward areas there are many pitfalls into which the unwary may stumble but which with forewarning can be easily avoided.

The unit to which we belong has been working for a year and has functioned through two campaigns involving three different types of military operations. It is based on the Middle East establishment and carries, in addition to the surgeon and anaesthetist, a corporal operating-room assistant, a lance-corporal clerk, two nursing orderlies, a batman, and two R.A.S.C. drivers. The Middle East scale of equipment is sufficient to provide a complete operating team, but all accommodation of the patients before and after operation and all nursing are provided by the medical formation to which the unit is attached. This equipment can be summarized in the following way. Two tents, one large and one small, are used as a theatre and a sterilizing room. Enough instruments are carried to tackle any case that may arise, but the numbers of these instruments are kept down to a reasonable figure. Tents are also carried to accommodate the personnel. In addition, a reserve of stores—particularly plaster, anaesthetics, and dressings—is taken to deal with about a hundred cases without replenishment. With these provisions a Field Surgical Unit can join a Field Ambulance, a Field Dressing Station, or a Casualty Clearing Station, and provide or supplement the surgical facilities of that unit.

From December, 1942, to June, 1943, our unit was with the Eighth Army during the advance to Tripoli and Tunis. In September, 1943, it accompanied the invasion forces to Salerno. Here the work was of two types—the phase of forming and consolidating the bridgehead and then the subsequent advance through Italy. Under these three varying conditions it has been found that the basic principles—partly learnt by bitter experience and partly handed on to us by our predecessors during the long months of fighting in the desert—have not been found wanting. Minor alterations only have been necessary to cope with the changing conditions.

These principles may be described under the following headings: (1) co-operation with the parent unit; (2) minimizing fatigue; (3) note-recording; (4) extra equipment and comforts.

Co-operation with the Parent Unit

A Field Surgical Unit can be regarded as a graft on to a larger medical formation, and, like a graft, retains its entity but has to fit in with the host; unlike a graft, the host may be changed repeatedly, and the unit must be self-contained but adaptable. We feel that it should be an operating unit, pure and simple, which can handle its own equipment without calling on any outside aid. There is a danger that over-elaboration and attempts to increase the facilities carried and the scope of its capabilities may cause this essential to be forgotten. No host unit welcomes a request for help in setting up a theatre when their personnel are fully engaged in their proper and routine duties. Not all units to which one may be attached will have had previous experience of working with a surgical unit, and, even if they have, every team has its own peculiarities and foibles. We have found every unit with which we have worked more than willing to fall in with the suggestions offered. If these are made right at the beginning co-operation starts on the proper basis and minor frictions and irritations are avoided. There are several points that are always well worth stressing, and they can be divided into two categories—pre-operative and post-operative.

In the pre-operation or resuscitation ward, quite apart from the treatment of shock, much valuable time can be saved by the proper preparation of the patient before he goes into the theatre. This does not mean the whole routine of shaving and washing the affected area—indeed, this is better done under the anaesthetic—but rather attention to the sufficient removal of clothing, the adjustment of clean blankets, and adequate premedication. It is not enough to cut away the sleeve of a shirt or the leg of a trouser; each garment must be removed completely. A blanket which is heavily soiled with blood is a hindrance to resuscitation and a discomfort to the patient after operation; it is much better removed in the pre-operation ward than in the theatre.

Regular pulse and blood-pressure readings form an invaluable guide in assessing the response to resuscitation and the optimum time for operation. Intelligent orderlies can easily be trained to do this and record the readings for each case of any severity. In carrying the patient to and from the theatre we have used our R.A.S.C. personnel. Once they are trained in the routine it makes for greater speed and efficiency. The situation of the pre-operation ward is important. It must be as close as possible to the theatre; directly adjoining it is the ideal. The surgeon will need to make frequent visits between cases to watch both the work still to be done and the progress of the cases still being resuscitated. If these visits involve a long walk down a dark corridor or across the open, tripping over guy ropes at night, there will be increased fatigue, waste and loss of time. It is noticeable how slowly one accommodates to the dark after concentrated work in the theatre.

The post-operation ward, if accommodation allows, should be reserved for the seriously wounded cases which will need special care and attention. If every minor case is sent there, awaiting evacuation, the nursing staff will be unable to devote proper time to the more difficult patients. We have made it a rule to write post-operation instructions in fair detail on the Field Medical Card for all serious cases. Until the orderlies have become accustomed to the methods and routine, frequent visits have to be made to the ward to ensure that all instructions are being carried out. Although the parent unit will usually detail an officer to look after the cases after operation, the responsibility naturally rests with the surgeon.

During a prolonged spell of work there is a great temptation to get away to rest or bed when a lull occurs, and the anxieties and repeated requests for opinion and advice from a ward full of "belly" cases can become a great strain. This almost hour-to-hour supervision must be done, however, if tragedies are to be avoided.

We have found that the orderlies are all keen to learn and soon develop an appreciation of the various procedures. Once this appreciation has been achieved things are easier, but they must be watched very carefully during the interim stage.

Minimizing Fatigue

One of the most pressing problems of forward surgery is the mental and physical fatigue that is inevitable during a heavy rush of casualties extending over several days. This is especially so when the team is the only operating unit attached to a Field Ambulance or Field Dressing Station. When there is more than one team the onset of fatigue can be postponed by adopting the shift system. An operating team can carry on for many hours before the members are so tired that they have to stop from sheer exhaustion, but there is a stage when judgment and operative skill fall far below a satisfactory standard. This acute fatigue must be distinguished from the chronic variety which comes on insidiously after weeks of steady and unrelieved operating.

There are several ways in which the powers of the team can be conserved. It must be realized that it is not only the surgeon who bears the strain but the team as a whole. The operating-room staff will have to spend much time preparing the theatre before operating and cleaning up after the last case. Probably the most important factor is the strict working to a routine. Every man should have his place in the scheme and keep that place. The surgeon will then be able to relax until everything is ready for the start of the actual operation. In a short time the orderlies become remarkably efficient, not only in preparing the patient but also in spotting unadvertised

wounds and subcutaneous foreign bodies. It should only be necessary to tell the O.R.A. the nature of the next case for him to have ready all the routine splinting, plaster slabs, and bandages that will be required. To achieve this routine it is as well to practise during any preliminary training period many of the more important duties. This should include such things as tent-pitching, the off-loading and loading of lorries, the setting up of the theatre, and the preparation and application of some of the larger and more intricate plasters.

Any extraneous noise is distracting, and there should always be at least a short passage and a double screen between the theatre and the ward. While visitors are welcome, we insisted that the numbers of spectators and helpers should be kept down to a minimum. If the case is not a serious one the instruments are used on the cafeteria system: a complete set is laid out on the Mayo table and sufficient taken for the case; this reduces sterilization as much as possible. On the ordinary case we have not found it necessary to have a "washed-up" assistant. With the limited numbers of orderlies available it is better to keep them free to help in moving the patient, put on bandages, or clean and sterilize the instruments used on the previous case. Hot sweet tea is excellent for reviving a flagging team, and a constant supply between cases is most welcome and valuable. (A minor point worth mentioning in this connexion is the desirability of having a latrine fairly close to the theatre.) There is some difference of opinion on the question of using one or two tables. A team working with two tables can achieve a faster rate of turnover but there is a greater strain on all the orderlies. This method is apt to introduce an atmosphere of rush and hurry that must be avoided at all costs. There is a limit to the number of cases that can be cleared in a given time, and working with two tables is liable, in our opinion, to hasten the onset of the danger-point in fatigue.

When working as a solo team it may be difficult to get enough time for sleep. Every lull must be utilized to the full, and even then it may become a matter of short sleeps at irregular intervals. It is important that the men should have sleeping quarters which are close to the theatre and quiet at all times. Rest periods must not be disturbed to allow the men to attend the routine unit meal-times, and the parent unit will usually arrange that something is available at the cook-house at any time. Much of the strain falls on the O.R.A., and we have found that he will benefit by a morning or afternoon right away from the camp every now and then. A trip to the medical stores or with a patient to another medical unit makes a good break. This has the further advantage that it accustoms the other orderlies to working without him, a safeguard in the event of his becoming a casualty.

Note-recording

It need scarcely be pointed out that operation notes must be full, accurate, and easily read. This last requirement is the most difficult; even with the clearest of writing it is not easy to make the essential features of a case stand out from a closely written card. When a convoy arrives at a base hospital a rapid survey of all cases has to be made, and it can be very wearying to read through a long description, trying to pick out the salient points. Typewritten notes with bold underlining of all facts of importance are by far the most satisfactory, and a typewriter, if it can be obtained, is invaluable. A point often overlooked is the filling-in in block capitals of the diagnosis on the envelope. In addition to any relevant special labels we also made a practice of printing on this envelope any special instructions for the medical units on the line of evacuation. As examples of this one may mention such headings as "Suprapubic cystotomy," "Watch circulation in foot," "Potential gas gangrene." This ensures that these points will not be missed.

During operations the unit clerk has a table reserved for his use in the theatre. His duties are: (a) To check up the particulars of the patient and discover the time of wounding before the start of the anaesthetic; these are entered in the operating book. (b) To type the operation notes as dictated to him during or after the operation. (c) To write a short précis in pencil in the operation book. It is more convenient to write up all the cases at the end of a list than at the end

of each operation. The space between cases may well be taken up in reviewing the pre-operation ward. It is surprising how easy it is to forget the detail of some of the earlier operations, and these pencil notes are a great help. (d) To search the pockets in any discarded clothing, collect the contents, and see that they leave the theatre with the patient.

Extra Equipment and Comforts

In addition to the ordinary scale of active service equipment there are a few extras that make the difference between discomfort and moderate comfort. There are two considerations of importance that are antagonistic to each other. First, the unit must remain mobile and the accommodation on the transport is limited. Any large accumulation of non-essential stores will mean that a corresponding quantity of essentials cannot be carried without overloading the lorries. Secondly, prolonged spells of operating on severe and mutilating wounds are somewhat depressing. The efficiency of the unit will suffer if a few extras are not available to allow recreation, relaxation, and an occasional "brew-up" during quiet times. A personal visit to the N.A.A.F.I. will usually secure sufficient tea, milk, and sugar and other minor comforts. We carry with us a small library for the men, which is changed when possible. Penguin books are a convenient size and can often be exchanged with other units. Gum-boots, a leather jerkin, a small primus stove of the collapsible type, a clasp knife with a strong tin-opener, and a spare roll of toilet paper are all items well worth carrying if they can be obtained.

It is not claimed that this article contains any profound observations or original points—others who have worked in forward areas may disagree with some of our opinions—but it is an attempt to describe some of the things that we did not know when we started out and which we know now. It has been our good fortune to have a close liaison with the units to which we have been attached and the base hospitals to which our cases have gone. We record with great pleasure our thanks for the help that they have given us and the kindness they have shown us. For reasons of security they must remain anonymous. We also wish to record our thanks to Col. C. Donald, Consulting Surgeon, Eighth Army, for his help with this article.

ADDENDUM

The following explanatory note has been added by the Army Medical Department, War Office.—ED., B.M.J.

Surgery with a relatively independent mobile team and at a forward centre in the field has always made a strong appeal to the imagination; the views expressed in this article backed up by considerable experience should prove both welcome and valuable at the present time when a considerable number of Army surgeons are posted to Field Surgical Units. It is hoped that this note will assist those who are not conversant with the organization of the forward surgical service in the Army, without detracting from the merits of the article. The lay mind, attracted by the idea of providing expert surgery well forward in the battle zone, is too apt to forget that unless adequate rest and post-operation nursing are also provided the benefits of surgery may be completely lost. Operation is only one stage in the treatment. A proportion of the severely wounded men whom an advanced surgical centre must treat cannot be moved in under seven to ten days without grave risk.

The employment of Field Surgical Units is governed by two definite limitations: (a) The unit is designed for operating only; it cannot hold or nurse patients after operation. Consequently, this one-team unit is not self-supporting in the medical sense, although independently mobile; it carries the necessary surgical equipment—a tented theatre, with bivouacs for the personnel—but possesses neither ward accommodation nor staff for post-operation nursing. It must, therefore, be attached to a unit capable of providing both. (b) Again, there is a limit to the number of wounded the unit can deal with in any one day. Sixteen to twenty serious wounded may be regarded as a capacity load for 24 hours: of these, the last four or five may have to wait 15 to 16 hours for their turn on the table. Delay of this length may well prejudice their chances of recovery. Herein lies the necessity for good triage. The unit must not be permitted to become "cluttered up" with patients who can be evacuated.

Surgical Centres : their Formation and Siting

The term "surgical centre" implies the existence of facilities not only for major surgery but for holding and nursing patients up to 14 days, if necessary. The Forward Centre for the troops of fighting formations is normally formed by a C.C.S. which can provide all the requisite facilities. It carries two surgical teams. Surgical reinforcement is provided as required by attaching Field Surgical Units. An Advanced Centre is established only when the distance between the evacuating units (Field Ambulances) and the Forward Centre is such that the "time-lag" for the serious wounds is beyond the margin of safety. This Centre is formed by attaching two or more Field Surgical Units, usually with a Field Transfusion Unit, to a Field Dressing Station, light section of a C.C.S., or a static Field Ambulance. It is seldom possible to post Army Nursing Officers (Q.A.I.M.N.S.) to an Advanced Centre, so that the standard of nursing and accommodation is not so high as that at the normal centre. These disadvantages are unavoidable; the additional risks are justified and offset by the urgency of the surgery.

Correspondence

Prevalence of Ketosis in Children

SIR,—It is regrettable that following Dr. Evans's excellent description and careful observations in cases of "sick stomach-ache" (March 25, p. 432) it is the end-results that are stressed and treatment advised to neutralize them, while the causative allergic basis is not realized so that the proper prophylactic treatment can be inaugurated.

During the past fifteen years, in dealing with large numbers of allergic children and adults, I have labelled the various symptoms described by Dr. Evans as "abdominal migraine" to indicate the usual sequel. These symptoms occur extremely commonly in everyday practice, and their allergic origin is totally unrecognized. As in most illnesses of young children abdominal symptoms are most obvious, so in the parent's history they predominate—lack of appetite, abdominal pain, nausea, or vomiting, often accompanied by a sudden high temperature up to 104° F. for a few hours. Perhaps only one of these symptoms will be present in each attack, but sooner or later others appear, and new ones may replace former ones. It is only towards puberty that the children voluntarily describe any headache or eye signs, but will admit such much earlier if specially asked. A well-marked family history of migraine, sick headaches, or other allergic conditions can be elicited usually, as well as other allergic conditions in the individual sufferer.

The attacks may be due to a sensitivity to environmental articles (bedding, pillows) if appearing predominantly in the night or on waking, and to foods if in the day. But later most cases show a combination of both groups of allergic factors, and the apparent exciting cause appears to be some non-allergic factor which lessens or depletes the protective adrenaline production—the nervous or physical exhaustion mentioned by Dr. Evans, or, more correctly, a chemical exhaustion. The primary factor is not so much faulty fat metabolism as that the "fatty" foods are those to which children are most commonly allergic—milk and other dairy products, egg, pig products, chocolate, and fish-oil emulsions. Glucose proves beneficial because it provides immediate essential energy, in itself never producing allergic reactions, and diminishing the "acidosis." A high percentage of cases, and especially those with a poor appetite, show a low curve of free hydrochloric acid on fractional gastric analysis.

The most effective treatment in these cases is to skin-test the child to determine the causative allergen and avoid the cause if possible; medicinally, to give, say, to a child of 7 years, 15 m of dilute hydrochloric acid B.P. in a wine-glassful of water at the beginning of each meal, 1/2 gr. of ephedrine hydrochloride at bedtime, and 3 to 4 tablespoonfuls of glucose a day in drinks. An acute attack can frequently be cut short by a hypodermic injection of 3 to 5 m of adrenaline chloride, 1/1,000 solution, as the intense abdominal pain is

due to a spasm of the smooth muscle of the bowel together with some urticarial oedema of the mucous membrane with the consequent retention of faeces. In severe cases of abdominal migraine it has been my custom to give the mothers a note stating in my view the nature of the case, and asking that the appendix be not removed unless there is very evident proof of its inflammation; since when the incidence of useless appendicectomies in these cases has lessened.

Let us recognize the true basis of cyclical vomiting or sick stomach-aches in childhood and prevent the sick headache or migraine of later life, so that the Home Guards of the next war will not be heavily fined for missing a parade on account of a migraine attack, and the consequent indignation caused among Members of Parliament, where so many bad sufferers seem to be congregated, may be allayed.—I am, etc.,

London, W.1.

GEORGE BRAY.

First Aid for Burns

SIR,—The letter from Col. Colebrook (March 4) calls for some observations. No clue is given as to the time when Col. Colebrook began this investigation because of "the absence of an agreed policy with regard to the first aid for burns." One had thought that as long ago as 1941 surgeons with wide experience of the treatment of burns and scalds were firmly agreed as to the policy which should be adopted for first-aid treatment—viz., all patients with extensive burns (of more than 5% of body surface), or burns complicated by other injuries or which involve the face, hands, feet, or eyes, should be treated only for shock as a first-aid measure and should receive further treatment at a hospital, to which they should be removed as rapidly as possible. A practical and detailed scheme of first-aid treatment for burns of all types is set out in E.M.S. Memo. No. 7 issued by the Department of Health for Scotland (June, 1941; price 2d.). I am not aware of any knowledge which has since come to hand which does not bear out the principles laid down in this memorandum, apart from the recommendations in it with regard to the use of tannic acid.

It is surprising that the covering of extensive burns with a clean cloth of some kind is not specifically mentioned by Col. Colebrook, in view of the emphasis laid on the danger of contamination by streptococci. It would be interesting to know what is meant by "considerable delay" in the "full-dress treatment" of severe burns. The decision to delay treatment in such cases is a serious responsibility, and such interim treatment as the application of the "Glasgow No. 9 cream" can hardly be called "first aid" under these circumstances. It appears that the potential seriousness of a thermal injury of 10% of the body surface is still imperfectly appreciated. It is not clear on which type of burn the cream may be left for only two days. I should be interested to know whether the extensive clinical trials of the cream included estimation of blood sulphonamide level and tests of liver function.

Finally, one wonders who is to apply the cream as a first-aid dressing. The injunctions regarding the prevention of streptococcal infection are admirable in theory but are evidence of a lack of appreciation of the circumstances under which the cream may be used. Even if the cream is obtainable, such precautions as masking and washing of hands are difficult to observe in the average tenement of a Scottish town, as Col. Colebrook should know from his recent experience in Glasgow, and equally difficult during or after an air raid. Under these circumstances plastering the burn with cream is a waste of time, and must be classed as meddlesome and valueless.—I am, etc.,

Edinburgh.

A. W. WILKINSON.

** We have sent a copy of the above letter to Col. Colebrook, whose reply follows.—ED., B.M.J.

SIR,—The investigation of first-aid procedures referred to in the *Journal* (March 4, p. 342) was begun in May, 1942. I had not then heard (nor did I until last week) of the pronouncement (June, 1941) by the Department of Health for Scotland, to which Mr. Wilkinson refers. Unless that pronouncement includes full bacteriological evidence as to the efficacy of the first-aid measures recommended for warding off infection by haemolytic streptococci I still think there was a good case for