Comment

Marked leucopenia is an uncommon feature of glandular fever. In only 7 out of 64 cases of Bernstein’s (1940) detailed series was the leucocyte count below 4,000 per cu. mm. The lowest count found in the literature is one of 1,500 per cu. mm. reported by Davidsohn (1937).

The granulocyte depression was very transient in the case reported here, the marrow appearances eighteen hours after the lowest peripheral count showing active myeloid regeneration, being followed by a steady rise to normal.

REFERENCES


UNITED KINGDOM ARMY MEDICAL SERVICES
ANNUAL EXERCISE

BY

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SUMMARY

The Royal Army Medical Services hold an annual Director-General’s exercise which features the latest opinions and doctrine regarding the role of medical troops in modern warfare. The 1959 operation, held 1 to 4 October, was named Exercise Medical “Canaletto” for a Venetian painter of the eighteenth century. He has been called the “Master of Perspective,” and it was the aim of this exercise to place medical problems arising from nuclear warfare “in proper perspective.” The first day’s programme consisted of a series of lectures at the Royal Army Medical College, Millbank, London. The next two and a half days consisted of tactical problems, discussions, and demonstrations at the Field Training Centre, Royal Army Medical Corps, Keogh Barracks, Ash Vale, Surrey. This phase was classified “Restricted” (U.S. “Confidential”).

LECTURES (LONDON)

Attendance at Millbank was restricted to some ninety senior officers of the Royal Army Medical Corps, including the Senior Medical Officers of major commands in the United Kingdom and abroad; several prominent civilian consultants to the Army; the Directors-General, or their deputies, of several other countries, including Denmark, France, the Netherlands, Norway, Turkey, the United States, West Germany, and Yugoslavia; and certain foreign medical liaison officers based in London. The programme consisted of the following major topics: (1) Initial treatment of burns; (2) Nuclear radiation; (3) Isolation and the will to live; (4) Anaesthetics; (5) Surgery of trauma; (6) Arterial grafts.
Initial Treatment of Burns

Treatment within the first twelve hours was discussed by Major A. B. Forage, Royal Army Medical Corps (Burns Research Unit, Chester Military Hospital). This was a conventional discussion of burn physiology and fluid requirements. Water taken with electrolytes by mouth was barely mentioned. Major Forage advocated covering the burned areas with a loose polythene (polyethylene) bag after cutting away burned clothes. Polythene is available as sterile tubing in sizes large enough to slip over a limb or trunk. Arguments presented for the method were: (1) by increasing the local humidity about the burn, evaporation of plasma is reduced and consequently the incidence of shock is reduced; (2) it forms a non-sticking dressing through which the burn may be observed. He also recommended cut-down on veins and insertion of an in-dwelling plastic cannula to a distance of nine inches. He demonstrated a sterile field cut-down package, packaged in polythene.

Mr. R. J. V. Battle, a prominent London plastic surgeon, spoke on the treatment of burns within the first few days. The polythene tubing did not appeal to him. He felt that it was important that a firm, dry eschar form over the burn as early as possible, and that tubing would delay this, with the result that the burn would present a wet, soggy surface prone to infection. He maintained that although potentially desirable, the open method of treatment was not practical in a battle situation. He recognized the undesirable features of porous, sticking bandages, but felt that in the military situation they probably could not be avoided. He advocated investigation for military purposes of sheets of a polyurethane sponge material as a pad under patients with circumferential burns. He is using this material clinically at St. Thomas's and other hospitals; it is readily sterilizable, re-usable, and non-sticking. The Director-General, Royal Army Medical Corps, Sir Alexander Drummond, stated that the polythene bag was not planned for use as a long-term dressing, but only for the evacuation phase.

The next speaker was Mr. A. B. Wallace, an eminent Edinburgh plastic surgeon who is especially interested in burns. He advocated no treatment in the forward areas, but assessment and complete clinical recording at the first rear area. Mr. P. W. Clarkson, Honorary Civilian Consultant (Plastic Surgery) to The Queen Alexandra Military Hospital, Millbank, also had reservations about the polythene bag, believing it would lead to wound cavitation. Major Forage's rebuttal was that the bag had worked well in his cases, provided good protection for the burn, permitted easy painless inspection, and was suitable for both arctic and tropical areas. The lectures and statements by visitors were primarily on treatment of burns; they did not often come to grips with the logistic and other problems relating to mass burn casualties.

Nuclear Radiation

Lieut.-Colonel J. A. H. Brown (Army Medical Liaison Officer, Medical Research Council Radiobiological Research Unit, A.E.R.E., Harwell) discussed the increased importance of gamma and neutron radiation with the advent of
smaller weapons. He stated there was evidence indicating a preferential damage by neutrons to the gastro-intestinal tract and that a high proportion of the casualties from small weapons would demonstrate a choleraic syndrome or a central nervous system syndrome (high dosage). In private conversation later, he stated that the evidence for the preferential action of neutrons on the gut was discussed in a report of the 14th Tripartite Conference (Proceedings on the Biological Effects of Radiation). A study of the report showed that his remarks were apparently based on Upton’s mouse data and that the conclusion of the group was that neutron and hard gamma produced approximately the same effects of early (30 days) military significance. The impression left by Lieut.-Colonel Brown, and alluded to several times later in the exercise, was definitely that neutrons predisposed to the gut syndrome. Professor J. F. Loutit (Director, M.R.C. Unit, A.E.R.E.) expressed the opinion that following radiation damage there was no true repair of cells but only replacement. He felt that no prophylactic pill of practical importance to the military would be available in the foreseeable future. He explained the mechanism of action of some protective chemicals by stating that they were substances capable of mopping up the excess hydroxyl ions resulting from irradiation of body water. Professor J. R. Squire (Experimental Pathology, University of Birmingham) thought it possible that we might raise the LD-50 from the neighbourhood of 500 rem to about 1,000 rem with known agents, although they would also cause hypothermia and this might be undesirable in combat personnel. He felt that in regard to internal contamination we have been devoting too much attention to Strontium 89 and 90 and not enough to Iodine 131, and suggested that potassium iodide might be a useful drug to eliminate Iodine 131. For acute radiation sickness he advocated early phenobarbitone (phenobarbitol) and possibly artificial hypothermia. He advocated chlorpromazine and perhaps pyridoxine for vomiting. He advised care in using salicylates and cortisone because of their tendency to increase capillary permeability. He advocated early penicillin for control of infection, with other antibiotics being reserved for later infections. He proposed neomycin in the “choleraic syndrome” for sterilization of the gut and gamma globulin at a rate of .02 g. per kg. per week; that is, about seven grams per week for an average patient. He felt that the high incidence of hepatitis virus in the population made transfusions something to be undertaken with caution; platelet transfusions might become a practical and fairly common procedure, but platelet typing would have to be explored. He mentioned marrow transfusion and “secondary sickness” (delayed reaction to marrow homografts).

Isolation and the Will to Live

Three talks were presented, two on overwintering experiences in the Antarctic and one on raft survival in the Indian Ocean. Their Antarctic experiences (Colonel R. A. Smart, Major J. M. Adam) with groups of about twenty men emphasized the importance of prior knowledge of the medical history of the personnel and the value of pre-selection. They felt it was dangerous to extra-
polulate the experience gained with the highly selected groups of personnel in the Antarctic to average military personnel. In short, they had few serious problems. Lieut.-Colonel E. M. Turner, Q.A.R.A.N.C., was the sole survivor of two successive sinkings of ships evacuating personnel from Singapore in February 1942. She spent four days without food or water on a one-man life raft in the Indian Ocean. During this period some fourteen of her companions perished. She then spent the balance of the war as a Japanese P.O.W. The most difficult period was a six-month jail sentence with another woman in a small cell four paces long. They were permitted only two five-minute exercise periods per day outside the cell. Methods of combating boredom during this period included playing checkers with stones on the floor and taking long walks inside the cell, during which she and her comrade imagined they were "walking the leafy lanes of England, with a fine meal at the end of the stroll in a country inn." Group methods of combating boredom at a later period included playing cards and mah-jongg with home-made sets, and concerts with various individuals humming different instrumental parts. She attributed survival to: (1) self-discipline; (2) contempt, rather than active hate, of their captors; (3) religion; (4) an implicit belief in ultimate rescue. Brigadier E. A. Bennett (late Consulting Psychiatrist, India Command) wondered why one should be alarmed at isolation. He stated that for many personality types isolation might prove a welcome interlude. He stressed the extreme value of self-discipline and said, "The job of a soldier is to fight and, if necessary to fight alone." Brigadier G. W. B. James (late Consulting Psychiatrist, Middle East Forces) stressed selection on the basis of personality for missions in which capture and isolation were serious considerations. He felt that the oral type (in the analytic sense) were poor risks and gave up too easily. The compulsively meticulous individual who was loath to delegate authority was an excellent risk for long periods of isolation. He was frequently a good leader for small isolated groups. Chaplain-General Pike, as might be expected, stressed the role of faith in a supreme being as a strong aid to survival.

Anaesthesia

Colonel K. F. Stephens emphasized the urgency of a simple, safe method for giving short anaesthesia to large numbers of patients. He introduced Dr. J. G. Bourne of St. Thomas's Hospital (London) who described some clinical experiences with a mixture of cyclopropane, oxygen and nitrogen, which Bourne considered an excellent anaesthetic. Colonel Stephens then demonstrated a simple device consisting of two sparklet pressure bottles charged with 50 per cent cyclopropane, 25 per cent hydrogen, and 25 per cent oxygen. These bottles were placed in a very simple dispenser and used to charge a standard six-litre anaesthesia bag attached to a standard child-size soda lime cylinder, a two-way valve, and a standard face mask. He stated that in this mixture cyclopropane was not explosive. He has trained a large number of dental technicians and other personnel to use this apparatus successfully after only 15 minutes of indoctrination and illustrated this with a short film. After the bag is charged, it
is held on the face for 3½ minutes (by egg-timer); the patient is ready for operation 1½ minutes after application of the mask. The procedures allow about five minutes’ operating time. If it is necessary to prolong the operative procedure, the bag is refilled and applied to the patient again when the first reflex movements appear. His arguments for cyclopropane were: (1) since it is poorly soluble in blood a concentration is quickly reflected in the tissues and induction is very rapid; (2) since it is a weak anaesthetic, anaesthesia “accidents” are not encountered. He presented in detail arguments against gas-oxygen-ether, chloroform, open drop ether, and thio­pentone (pentothal). He stated that the device is undergoing clinical trial at present, and he hoped to have better than a thousand cases to report at the next meeting. For combat he would recommend a 40 per cent cyclopropane, 30 per cent oxygen, 30 per cent nitrogen mix. A corpsman could carry sufficient gas for 50 patients in his haversack. Professor R. F. Woolmer, an eminent anaesthetist, reminded the audience that it has been only 150 years since troops with Wellington were routinely operated without anaesthesia, and that in the event of a mass casualty situation it would probably be necessary to consider this possibility. In regard to Colonel Stephens’ objections to chloroform and ether by the open drop method, he stated that anaesthesia could be successfully administered by alternating chloroform and ether in this method. Dr. R. W. Cope felt that cyclopropane was “on the way out” clinically and recommended the use of a muscle relaxant and thiopentone (pentothal).

Surgery of Trauma

Major-General I. Papo (Consulting Surgeon, Yugoslav Army) detailed the history of surgery for war wounds and recommended initial wide excision of devitalized tissue with delayed primary suture at four to seven days. He emphasized the dangers of early primary suture of wounds. Comments of the several consultants and General Papo’s talk on arterial grafts were not heard by this observer.

PROGRAMME AT ASH VALE

The theme was to study the “collection, evacuation, and management of casualties within the combat zone.” Attendance at the Field Training Centre, Ash Vale, Surrey, was approximately 200. Officer personnel from the first day were augmented by representatives from other Corps of the British Army, senior medical officers from various home commands, and about forty senior reserve medical and dental officers (Territorial Army). To avoid classification of this report, it may be simply stated that the situation involved defence of an area containing several cities in 1965. Aggressor troops were assumed to possess tactical air superiority and to possess and employ tactical nuclear weapons. The ground situation in one sector was depicted on a large scale floor relief map which showed deployment of forces, weapons, vehicles, medical facilities and medical personnel.
Field Demonstrations—First Day

(1) Two infantry companies deployed for nuclear combat. Realistic simulation of several small weapons detonating. Object was to demonstrate dispersal and effective range of small-weapons effects.

(2) Static demonstration: A shallow dug crater with field tape outlining isodose contours at H + 1. This was of doubtful value since neither size nor height of burst was specified. General reaction: “This is no worse than a conventional munition.”

(3) A demonstration of hasty decontamination of troops. Outer clothes removed and shaken, vigorous dusting of personnel. Mouths and noses were covered with wet handkerchiefs.

(4) A field messing demonstration, with field kitchen dug in. Equipment and stores did not compare favourably with similar U.S. gear.

Immediate Medical Care and Evacuation—Discussion

It was estimated that the nuclear strikes promulgated in the problem would cause approximately 500 casualties, with about 300 litter cases. Considerable discussion arose over the desirability of retention of a medical unit roughly equivalent to a WW II U.S.M.C. Regimental Clearing Station about 10 miles from the contact area. About half the groups felt that evacuation should be from small forward aid stations direct to far rear (20–40 miles). The others believed that air evacuation could not be assured and that such an intermediate station was essential. Comment: Little reason to discuss in detail, since British medical deployments, manning levels and logistic support are not directly comparable to Fleet Marine Force. It is felt that the following points were neglected: (1) It was assumed that medical facilities would escape fallout. (2) Prompt enemy exploitation was excluded. (3) Roads and bridges to rear were considered open (despite enemy air superiority). (4) Effect of civil population on military movements was not included. They made the following points: (1) It might be four hours before organized collection of the wounded could commence. (2) Present allowances of litter-bearers are inadequate. (3) The area must be cleared of the wounded as soon as possible to permit a nuclear counter-attack. Discussion of this immediately post-strike phase was unfortunately curtailed.

The “Hovercraft”

This device was discussed by representatives of the builder, Saunders Roe Ltd. It is a saucer-like airborne craft which hovers approximately 18 in. off the ground and is supported on a cushion of air provided by two concentric rings of air jets. Forward motion is accomplished by interrupting the rear wall of the curtain and allowing cushion air to escape. Directional control is obtained by mounting rudders in ducts through which air is pumped from the main plenum chamber. Several models of the device have been built, and one prototype roughly 20 feet in diameter. It was stated that the lift capacity of the prototype was 20 men. The presently installed power plant (Leonides aircraft
engine) cannot raise the device more than one and a half feet; it is feasible to get
dlifts to about 4 or 5 feet, but this is very expensive in terms of power. Forward
propulsion is also expensive, but hovercraft-principle platforms without the
ability to manoeuvre are very economical in power. Trains of such platforms,
towed by a wheeled vehicle or a manoeuvrable hovercraft, should be feasible
because of the very low frictional component between the hovercraft and the
ground. The films showed a definite spray problem over water. The ability
of the craft to make the water-shore transition is at present limited by the slope
of the beach, and the demonstrations were all on very flat beaches. The craft
cannot cope with barriers 3-4 ft. high. The design is certainly of great interest
for flat or rolling open country, marshes, lakes, frozen tundra, etc. The ride
appeared very smooth, with the air cushion supplying a very effective damping
action. Side-by-side contrast with a military ambulance traversing the same
terrain was dramatic. In situations in which the craft can be used the wounded
men would endure far less jolting than in a wheeled vehicle or boat.

Later there was a live demonstration of a one-third scale model (radio
controlled) over water. The extremely small amount of push needed to send
the model skimming for great distances was impressive. It was evident that
very little motive power would be necessary to pull a string of such platforms.

_Demonstration “March of Progress”_

A fine spectacle demonstrating with original uniforms, equipment, docu-
mentation, and skilled acting, the military evacuation of patients from _circa_ 1800
to the present. It is amazing that until recent years any patients survived. Current
R.A.M.C. ambulances were not impressive. A three-ton very large box type
(said to be underpowered) carried only four patients. To convert jeep-type
vehicles to ambulances, special struts are installed which result in much greater
litter overhang than on the U.S. type. In the field demonstration there seemed
to be a definite whip action as a result of the long overhang. Nothing equivalent
to the “mechanical mule” was demonstrated; the only advancement seen over
WW II was conventional helicopter lift.

_Survival and Rescue at Sea_

A Royal Navy seminar, consisting of Surgeon-Captain Baskerville, Surgeon-
Lieut.-Commander O. Rawlins, and Surgeon-Lieut. T. Barrington, and using
the historical approach, presented some excellent and appalling examples.
The value of discipline was pointed up by contrasting two sinkings off West
Africa. In 1816 almost 75 per cent of a large group with adequate stores perished
in four days (wine, sun and mutiny). In another most of the crew of an over-
loaded open boat survived a three-week trans-Atlantic crossing because of
disciplined rationing of stores, etc. Current designs of British life jackets and
immersion suits were demonstrated. It was stated that survival in cold water
was enhanced if the occiput could be protected from chilling. A standard solar
still capable of supplying 4 oz. per hour was shown, as well as a miniaturized
combination radar beacon and the short-range transceiver for downed aviation
personnel. The myth of squeezing raw fish to provide water was effectively exploded; using several fresh fish and a large screw-jack press, only very small amounts were expressed.

The audience then moved out to a nearby lake where all equipment discussed in the seminar was demonstrated "live." The Royal Navy 20-man inflatable life raft has several inflatable ribs supporting its canopy. A helicopter was able to home on the portable radar beacon, and rescue was facilitated by direct conversation on the transceiver between downed pilot and cockpit. Two methods of pick-up were demonstrated: a scoop net and a sling.

Radiation Casualties

Lieut.-Colonel H. Whitcher, R.A.M.C., presented a review and summary from the viewpoint of the field surgeon. It was stressed that gamma and neutron were the principal casualty-producing radiations, although some beta burns might be seen. Chemical prophylaxis might be very worth while, even if it raised the LD-50 only by a factor of two. Colonel Whitcher emphasized treatment on the basis of presenting symptoms and not on the basis of dosimeter readings. He pointed out that present knowledge furnishes no guides to treatment other than empirical and supportive. He pointed out that gut symptoms were the important ones to the forward area surgeons, and emphasized evacuation priorities. Comment: Remarks on this point were consonant with U.S. military practice. At the present time the British Army does not have field combat personal dosimeters. Whether or not they will procure and issue large numbers (as U.S.N. and U.S.A.F.) or only a few per unit (as U.S.A.) is not decided. There is much emotional opposition to segregating "expectant" (i.e., probably non-surviving) patients.

Forward Surgical Team Equipment—Current, Transitional, and Future

A helicopter demonstration showed that the transitional gear could be transported in three medium helicopters which could all be off-loaded into jeeps and jeep trailers in less than five minutes. The present gear is not designed for airlift, weighs approximately four tons and is packed in a miscellaneous assortment of wooden crates and boxes. A great many items have been declared excess or outmoded and are being deleted, such as the gas-driven electric generator. It is now felt that the forward surgical team will be used to augment an existing medical installation; power and certain other "housekeeping"-type services will be provided by that facility. Galley equipment has been deleted on the same premise. Kerosene-fueled primus stoves have been deleted in favour of gasoline-operated devices. The field autoclave is deleted and has been replaced by a German patent chemical method ("Tego"). Operating linen has been replaced with plastic drapes and gowns, to be sterilized in "Tego." "Tego" is a liquid and said to render items sterile in 2 hours at 80° C. or overnight at room temperature. It is said that a coating of the material on the hands makes gloves unnecessary. It has had some ten years of clinical trial in Germany, and it is claimed that skin hypersensitivity has not been a problem.
A rather cumbersome suction apparatus has been replaced with a small foot-operated device which appears rugged and efficient. The conventional anaesthesia machine has been replaced by the EMO anaesthetic outfit which is a compact ether/air inhaler suitable for face-piece or endotracheal tube. This outfit has apparently had considerable clinical trial and has proved entirely satisfactory. Cyclopropane and nitrous oxide and oxygen cylinders have also been deleted. Assorted surgical dressings are now pre-packed, pre-sterilized and supplied in cardboard cartons. The assorted wooden crates and cases have been replaced with wicker hampers, rather like square laundry hampers. All the gear has been packed so that any component can be lifted by two men. Weight has been almost halved. Future developments include further streamlining; probable replacement of wicker baskets by plastic; replacement of bottled liquids by liquids packed in collapsible plastic containers, etc. Comment: There was very little use of aluminium. I would say that except for the EMO anaesthesia outfit and the "Tego" sterilizing method, airborne surgery equipment of U.S.A.F. is considerably ahead. I saw no packaging that compared to present U.S. standard aluminium field medical kits. I do not know whether we have adopted the idea of units of assorted surgical dressings for supply and resupply; this looked very good. It was stated that the assortment was based on actual usage rates.

Seminar and Discussion—The Clearing Station ("Advanced Dressing Station")

It was assumed that by H + 16 some 70 per cent of the casualties resulting from the initial strike and from subsequent night probing action had reached stations roughly comparable to WW II regimental clearing stations. A proposed distribution of medical personnel and flow patterns was presented; it was fairly conventional. It was felt the professional teams could cope with the casualty situation for about five hours at maximum speed. No equipment such as wheeled Gurneys was available and the weak point of the dressing station was in litter bearers. Treatment of lying cases could involve three or four internal transfers from area to area. This threw a load on the litter-bearers organic to the station which could not be met without additional help. There was a sharp divergence of opinion over disposition of those patients who had recovered from their initial vomiting, or who were not seriously incapacitated by it. There are apparently no plans for decontamination prior to this station and only very vague ideas as to what skin levels should be considered for decontamination at this point. It was felt that shortage of water would preclude washing and that decontamination would consist mainly of brushing. Visitors' comments were that most fallout material initially present would have been bounced off the patient by the time he got to this station. There was considerable opposition to the multiplication of radiac equipment. There was lively discussion over the role the doctor should take in furnishing advice on radiation to the C.O. The impression was made that C.O.'s at present have few, if any, guide lines. There was a talk of adding "a scientific officer" to command staffs.
Evacuation to Rear

Several analyses were presented of the number of patients organic medical vehicles could transport. A rather discouraging view was taken of the number of helicopters available to the field surgeon in 1965, although even this limited number accounted for the greater part of the patient lift. Various line, transport, etc., officers spoke of the emergency transportation available to the M.O. While the transport officers indicated that very adequate numbers of vehicles would be available, most of the older medical officers felt that the estimates were highly optimistic. It was stated that maintenance of helicopters was so difficult that only a 20 per cent operational availability should be assumed and this during daylight only.

Major Demonstrations

Forward area evacuation. This area was presumed to have received serious initial gamma and neutron from several close tactical bursts. All organic transport including armoured personnel carriers ("Saracens") was utilized. It was emphasized that medical augmentation was necessary since the organic medical personnel had been exposed and could probably only function efficiently for about an hour. Although the Saracen is a large vehicle, its use as an emergency ambulance is limited; it can transport only one litter case.

Advanced Dressing Station (Medical Clearing Company)

(1) Monitoring Department. Each litter patient was deposited in an alley between shoulder-high sandbag walls (to protect operator). Probe suspended by a string from tent roof was swung over patient. Instrument installed was a peacetime low-level gamma dose rate meter. Operator was a young dental officer, not prepared to say at what gamma level he would direct patient to decontamination or triage. (Note: triage area was after survey area.) Walking patients were directed to walk past a fixed probe placed at about waist level.

(2) Decontamination. Those patients requiring decontamination were carried or directed to another tent where two methods were demonstrated; one was to vacuum the patient with an ordinary light vacuum cleaner whose exhaust was directed into a hole in the ground. There was no apparent venting arrangement, and it can be assumed that back pressure might be a problem. The other method was sponge washing. Gastro-intestinal cans for disposal of contaminated material were available; I saw no special arrangements to control run-off.

(3) Triage. Patients were processed in lines, each passing by a recorder and examining physician. This appeared to be a potential bottleneck situation. It also required the examining situs physician to decide treatment and disposition immediately, with no opportunity to reappraise a patient.

(4) Treatment areas. These were conventional field medical facilities.

(5) Galley and sanitary area. Field sanitation arrangements were similar to U.S. practice with perhaps more use of corrugated sheet metal. In several
J. H. Stover, Jr.

places an improvised system for furnishing continuous hot water had been installed. This consisted of a shallow pit containing gasoline pressure stoves, walled and built up with brick and earth, with a double-layer corrugated metal roof. The layers were separated by about \( \frac{1}{2} \) in. and the roof had a gentle pitch. Water from a reservoir was trickled into the high end, flowed over the hot metal, and was collected in a drum at the low end. The drum was provided with a stirrup-pump for pumping hot water over bed pans, etc. This has some obvious advantages over the batch method of making hot water commonly practised in the field by U.S. forces.

**Westminster Pod.** This was a full-scale mock-up of a mobile surgical unit utilizing the Westland Westminster helicopter. They are a five-bladed single-rotor craft of 21,600 lb. They stand on four bent legs, something like a lumber carrier, and straddle a “pod” 10.5 ft. × 8.5 ft. × 36 ft. The main fuselage can comfortably carry nine men. The demonstration consisted of a pod outfitted as a field surgery. Several features were very interesting:

1. The pod itself was used as a central supply and sterilizing area. Large let-down doors at each end assured ready off-loading of gear.

2. Rigid flooring for lean-to tents alongside the pod was built in sections which folded against the lateral bulkheads (externally). These provided a floor area 16 ft. × 32 ft. on each side of the pod when unfolded and were fitted with sockets to receive aluminium stanchions for the light plastic tentage. These areas were the operating suites, etc., and communicated by side doors in the lateral bulkheads with the interior of the pod (central supply).

3. The total rigid floor space available as a self-contained surgical unit is 1,500 sq. ft., about the size of a tennis court. The helicopter has sufficient lift to carry the pod, the folding floors, the tentage, 3,000 pounds of medical equipment, and a nine-man medical team. When so loaded the craft has a range of 266 nautical miles at 100 knots.

4. Arrangements of the operating units are variable, of course. As set up at Ash Vale an anaesthesia room, operating room, and recovery room were set up on one side; on the other side the recovery room was deleted, resulting in a large, two-table, complete operating room.

5. This demonstration appeared to be the answer to a field surgeon’s dream. It was roomy, had a dry floor, and the pod itself could easily house several critical post-operative cases in addition to serving as a central supply room.

**The medical holding unit.** This was a series of connected large field wards designed for management of serious radiation cases. Major problems were the disposal of vomitus and bowel excreta. I saw no particularly revolutionary ideas in handling this problem. Several styles of impervious sheets and blankets were demonstrated. It was planned that a minimum of medical officers would be attached to this ward, but that several dental officers and chaplains would be attached. Although there is considerable emotional objection to an “expectant” holding facility in the R.A.M.C., it was obvious that they realised such a facility.
must be established, and this ward was such a facility. It was anticipated that almost all the patients in this ward would be fatalities, that insufficient personnel would be available to dig individual graves, and that the patients would have to be buried in a mass grave. In this same area an air-portable water-sterilizing and storage apparatus was demonstrated. The rubberized tank was of conventional design, but the method of obtaining chlorine for sterilization was interesting. Chlorine and nascent oxygen were obtained by the electrolysis of a brine solution. The apparatus was small, the power demand was approximately 25 amperes at 3 to 4 volts, and it was stated that this unit could provide 1,000 gallons of potable water an hour. This device obviously greatly simplified the logistic support required for a water point in that conventional bulky chlorine-releasing chemicals or bottled chlorine were unnecessary.

Comment on Demonstrations

The advanced dressing station components exhibited in this demonstration were in the main conventional, although there were several items of interest. Supporting stanchions and roof braces for the hospital tentage were of steel pipe, but all members were of the same length and completely interchangeable. The tents were flat-roofed, with a slight pitch, and could be readily joined to one another. The tentage was unlined, and so would probably be hot in a tropical area, but it looked as though it would be very simple to erect with unskilled labour.

In most of the hospital areas litters were used as beds for the patients, with no sawhorses or folding legs. One ward was set up with folding metal field hospital beds; these were of light steel design with springs and appeared to be a better bed than was available to F.M.F. field hospitals in WW II. The design, however, was not as elegant as some of the new U.S.A.F. aluminium field hospital beds. The litters were all of an old pattern with very heavy wood full-length poles, non-folding. I asked about British progress in litter design using new plastic materials and extruded aluminium poles and was told that none of the designs so far presented had proved sufficiently rugged for field use. The British are acutely aware of the fact that logistic problems would be greatly simplified if a light, practical litter could be devised.

The reception and triage areas were not designed, in my opinion, in a manner which could cope with a sudden influx of large numbers of serious patients. Like all field hospitals, though, I think this would be immediately modified in the event of an actual emergency. It was planned to fully utilize dental officers, chaplains, and other ancillary personnel to augment medical officers in the event of a mass casualty situation. I got the impression that the British Army relied on their female nurses for professional nursing care in the field and that their medical orderlies were not as highly trained as U.S. Navy corpsmen.

The air-transportable field surgery package utilizing the Westminster Pod appeared to be a very fine arrangement for a mobile surgical team and would answer many of the requirements for such teams under the U.S.M.C. vertical envelopment tactics.
Patients in this demonstration were very realistically made up. Moulages were not generally employed; the wounds were built up of plasticine, collodium, etc., and then hand-painted. The make-ups were superior to those shown in field exercises at Fort Sam Houston.

**Seminar—Army Health in the Brigade Area**

A proposal was made for a “Light Hygiene Detachment,” consisting of one M.O., three corpsmen, two drivers, and two artificers (Sea Bees). Organic transport would be two jeeps, two jeep trailers, and two motor-cycles. The unit is to be an air-transportable environmental sanitation organization, whose mission would be to furnish emergency support for epidemic disease control. It would carry supplies of D.D.T., etc., and could be self supporting for some eight days. Duties would include mosquito and other vector control, checking water points, and waste disposal practices. They would be attached to the requesting unit for only limited periods. It was apparent that the need for such detachments was acute and the proposal was well received.

**Some Experiences of a Surgeon while a P.O.W.**

Dr. R. Harvey gave a highly entertaining account of experiences in the German P.O.W. system. The morale value of organized escape attempts, humour, and technical competence at distilling alcohol was emphasized.

**Another Look at Chemical Warfare**

Lieut.-Colonel H. W. Whitcher, R.A.M.C., presented a refresher lecture bringing the group up-to-date. It was pointed out that new agents were extremely toxic and that the percutaneous danger was high. The possibility of tactical employment of drugs affecting the psyche was mentioned. Although the talk was a somewhat sanitized affair, it was intended to remind doctors that chemical agents had not been forgotten by the weapons development agencies of the great powers.

**Summing Up**

Lieut.-General Sir Alexander Drummond, the Director-General, Army Medical Services, exhorted the audience to try the “school solutions” presented during this exercise in the war games of their own area commands. Several questionnaires were distributed for comment after local field trial.

**Comments on Captain Stover's report by the Commandant, F.T.C. and H.Q. A.E.R., R.A.M.C.**

It is always interesting and usually valuable to read a frank and unbiased critique. Captain Stover's report is especially valuable because it may stimulate some serious thought about combat development, or the lack of it, in the British Army Medical Services. Nevertheless, Captain Stover does appear in a few
instances to have concentrated on the details of some presentations, rather than on the ideas behind them. It may be of value to add a few explanatory comments.

It must be admitted at once that problems of security classification restricted the scope of some presentations and undoubtedly stultified discussion. For example, in describing the Field Demonstration (2) on the first day, Captain Stover doubts its value because size was not mentioned. It was in fact described as a low yield ground burst weapon. Further than this it was not possible to go.

Captain Stover makes some detailed comments on the discussion on Immediate Medical Care and Evacuation. Unfortunately discussion time had to be kept short in order that the very tight Exercise time-table could be adhered to. It was, moreover, stated by the officer making the presentation that fallout "rightly or wrongly" would be ignored at that stage, for the same reason as that now given. Early enemy exploitation was in fact described and the effect discussed at some length. The remark about roads and bridges being open is perfectly fair but of course there was only time for certain aspects of the problems to be considered. The Field Training Centre's proposals were, as it happened, based on exceptionally long ambulance car turn-round times, which were intended to account for delay in evacuation. So far as the civil population is concerned it was hoped that those in the Combat Zone would by then have been evacuated. The area described is not heavily populated.

The faults of current R.A.M.C. ambulances are of course well known and the author's comments are milder than those of many United Kingdom officers. Prototypes of new cars have been approved and troop trials are about to start.

Packaging of field medical kits is at present the subject of high priority study.

The author's mildly surprised note that there are apparently no plans for decontamination of casualties in front of the A.D.S. is interesting. Our view has been that the probable numbers of casualties, and the certain urgency of evacuation, would preclude a procedure which in many cases can wait a few hours.

With regard to helicopters, they are capable of night flying when given certain aids, and estimated availability will, by 1965, be of the order of 60 per cent—not 20 per cent as stated. A modification of the Saracen is now being produced which will carry three stretchers.

Captain Stover, by implication, makes the interesting suggestion that the medical officer carrying out Triage should have the opportunity to re-appraise a patient. The British view has certainly been that when dealing with large numbers of casualties, some form of conveyor belt system will be essential and indeed that the essence of the Triage department is swift skilful sorting. Errors will of course be made but they should be corrected later by someone else.