FLY PREVENTION: SOME SUGGESTIONS AND OBSERVATIONS FROM A GENERAL HOSPITAL IN NORMANDY, 1944.

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INTRODUCTION.

These suggestions and observations are put forward as an attempt to help in lowering the incidence of fly-borne diseases in theatres of war—an important aspect of Preventive Medicine. The notes were written in September and early October, 1944, and, on the advice of the Deputy Director of Hygiene, 21 Army Group, are now submitted for publication in the Journal of The Royal Army Medical Corps.

COMMENTARY.

74 (BR) General Hospital (600 beds plus three one hundred beds expansions) arrived at its present site on July 11, 1944, and was a busy hospital within a few days time. The first few weeks meant a "flat-out" effort by all ranks. During our first seven weeks we dealt with only two less than five thousand patients and our cases were naturally mainly surgical. A busy hospital does not run itself nor can it work efficiently unless the best use is made of its personnel and attached Pioneer Corps personnel. Our sanitary personnel consisted of three R.A.M.C. Other Ranks assisted by untrained Pioneers. I also employed carpenters and plasterers in making fly traps, strainer tins for the soakage pits, wooden lids for these tins, pot racks for kitchens, fly-proof safes, concrete seals and other improvised sanitary equipment.

The trapping of flies directly from deep trench latrines is not new. I described this and other aspects of fly prevention in an article submitted in 1943, for publication in The Journal of The Royal Army Medical Corps. The details of the bin lids mentioned in that article have, I understand, been sent to hygienists of 21 Army Group as a technical instruction. I regret I cannot have some of these bin lids for my swill bins here! I found them most useful in the M.E.F.
Since our arrival in France and up to the present date (October 3, 1944) there have been no cases of dysentery in this unit. The hospital for a time had one hundred beds allotted for dysentry patients, so we must consider ourselves lucky. There have been only three admissions to hospital with diarrhoea. The health of the whole unit has been very good although we have had from time to time mild cases of gastro-enteritis not requiring admission to hospital. The ratio per 1,000 of other ranks of the unit reporting sick since arrival in France averages 6·5 for the period.

The sanitary "products" of 74 (BR) General Hospital have been seen by many hygiene officers, including the D.D.H., 21st Army Group (Colonel W. W. S. Sharpe) and the A.D.H. (Lieut.-Colonel P. H. R. Anderson).

It is hoped that some of these suggestions may be of help in fly prevention. D.D.T. may be the answer to many of our fly problems but it is not yet available to any extent and supplies are strictly limited. It is considered that our hygienists do not receive enough support from many R.A.M.C. officers who are frequently not interested in hygiene and whose knowledge of field sanitation and sanitary discipline is frequently lamentably low.

I think I can claim to be "hygiene-conscious." A few days ago I swatted a fly, well and truly, with a copy of the "Handbook of Military Hygiene, 1943"; then smiled, relaxed and proceeded with the writing up of these notes!

SHALLOW TRENCH LATRINES OR OIL DRUM LATRINES.

It is suggested that shallow trench latrines are a much greater source of fly breeding than lightly buried unburnt food tins or neglected swill bins. Five-gallon oil drums can be used as an alternative to shallow trench latrines, pending the provision of deep trench latrines or disposal of faeces by incineration. It is, too, a simple matter to make fly-proof seats with self-closing lids for these oil drums. The five-gallon oil drum is eighteen inches in height and makes a convenient and comfortable latrine. Personnel should be instructed to urinate in a temporary urine soakage pit before using the oil-drum latrines.

The lid of the drum should be carefully cut close to the rim with a cold chisel and the cut surface hammered smooth. This only takes a few minutes to do and the cut drum lid should be saved.

When the drum is two-thirds full of faeces it is taken out of action and some fifteen bully beef or similar tins added to its contents. These tins do not require to be incinerated but must be pressed down firmly into the faeces with some sort of "punner."

A full bucket or rather more of well mixed earth and oil is then added and well rammed down with the punner. The drum lid is replaced when the drum is nearly full and more oil and earth added.

The contents of the oil drum can then be cemented over but this is not necessary unless the oil-drum latrines are being transported for disposal.

These oil and earth sealed oil drums are easily disposed of by burial in a trench two feet deep. They should be placed close together in the vertical position, covered with more earth and oil well rammed down, and the area marked "Foul Ground."

Non-returnable four-gallon petrol tins can be used as latrines, sealed in a similar manner and disposed of in the same way.

It is considered that shallow trench latrines are unhygienic anachronisms.

OWAY PITS.

Otway pits are frequently required if full incineration of faeces is not being carried out or where incineration is impracticable. I have used Otway pits in the Middle East and in Normandy and, as in most cases the contents (faeces from bed-pans of diarrhoea, dysentery and other patients) are mixed with cresol solution, have not found fly breeding in these pits. In my experience a fly trap on an Otway pit is unnecessary. Here in Normandy 74 (BR)
General Hospital have two Otway pits to deal with the faces from the Surgical Division and a further two some hundreds of yards away for the Medical Division.

As the only materials available shortly after our arrival were tree trunks, compo boxes, biscuit tins, sacking, and oil from a not-too-distant aerodrome, these Otway pits were constructed by attached Pioneer Corps as follows:—

1. Pits 10 ft. to 12 ft. long, 3 ft. wide, and 6 ft. to 8 ft. deep were dug and, although we struck rock on several occasions, we met no sub-soil water.

2. Trees were felled and stout beams cut a few feet longer than the trench. These beams were then placed lengthways over the pit and the ends countersunk to ground level.

3. Compo box lids or any available packing case wood were nailed over the logs and a faeces chute made from a biscuit tin placed centrally over the pit.

4. Oiled sacking was then placed over this platform to extend two feet (no, not four feet!) beyond the limits of the pit. Four feet of sacking round pits were unnecessary in this hard clay soil.

5. The whole was then covered by an earth and oil seal and a loose fitting lid with long sides placed over the faeces chute.

6. Later, and as early as possible, these pits were covered with a layer of concrete made from "acquired" or gifted cement plus sand laboriously brought to the site by unit transport.

To begin with we made an Otway pit for each Division and as soon as possible duplicated them. When one pit is full the faeces chute is sealed with a thin layer of concrete and the other pit taken into use. They have been alternated for use every three or four weeks.

When instructing Pioneer Corps personnel to dig Otway pits always ask for the well-nigh impossible, i.e. to have the pit two feet wide and eight feet deep. If you do not do this they will make the pit some 4 feet wide at the top! Also one should see that they dig embrasures in each corner and thoroughly loosen the soil at the bottom of the pit to help drainage. The construction of Otway pits requires constant supervision.

One of our Otway pits did not have a concrete seal for many weeks and its oil and earth seal was merely "muttered" over. It functioned as well as the others but mutter seals require some maintenance and are not easily kept clean as are concrete seals.

All four Otway pits have worked admirably, have been no attraction to flies and have given off no offensive smell. Latterly we have removed the faeces chute biscuit tins and made concrete faeces chutes. Fig. 1 shows a concrete covered Otway pit with its concrete faeces chute covered with a loose-fitting wooden lid with long sides which rest on the concrete platform and not on the raised chute. This lid ensures that even the most careless nursing orderly should replace the lid properly. When sand is available a layer of sand is laid for two feet round each Otway pit and covered soakage pit. This helps to keep them cleaner and there is less mud in wet weather.

Fig. 1.

Otway pit with concrete seal, fly-proof cover and sand surround.
Forty-gallon pitch drums make very efficient temporary Otway pits should such pits become filled by water seepage during prolonged wet weather and when, for any reason, incineration of faeces is impracticable. I found by experiment that it was easy to cement seal a forty-gallon pitch drum two-thirds full of water and thus equally easy to seal a drum two-thirds full of bed-pan contents.

To seal each bin the following steps are taken:

1. Add two full sacks of small tins (milk, or 2 lb. tins) to the contents of the drum and press down firmly with a "punner."
2. Add earth until drum is nearly full.
3. Stamp the earth down hard with the "punner" until the earth level is about four inches from the drum top.
4. Add a two-inch seal of oil and earth mixture and level this off.
5. Finally add one bucket of cement mixture, level this and leave drum in situ until the concrete is hard.

The sealed drums can then be rolled to the nearest foul ground area and left there marked "Bed Pan Contents," or alternatively they can be buried.

The sealing of a bin takes two men ten minutes and is a very simple procedure. Cement drums, although smaller, can equally well be used.

The same technique can be used to seal forty-gallon pitch drums two-thirds full of swill. Admittedly, there is practically no swill when troops are on compo rations but on the F.S. ration scale there often is. A recent routine order in this L. of C. Sub-Area instructs us, if there is no contractor, to pass swill through an incinerator and, if this is not possible, to bury it with certain precautions. Unless a very reliable N.C.O. of the Sanitary personnel is supervising such matters as the sealing of deep trench latrines, or sealing buried swill, then, fly breeding, except in winter, is bound to occur.

Soakage Pits and Grease Traps.

The standard four feet by four feet soakage pit can be used for at least three purposes:

1. Urine soakage pits to take the urine from wards and from latrine buckets used as urinals. These latter pending the supply of trough urinals by the R.E.
2. Sullage water pits for operating theatre, laboratory, dispensary and dental departments.
3. Temporary grease traps.

In most cases the soakage pits should be in pairs and far enough apart not to drain into the same patch of soil. These pits should be finished in the usual way with oiled sacking, oil and earth seal and then concrete seal with raised concrete "box" to contain the biscuit or petrol strainer tin which is covered with a wooden lid. Each tin is perforated with numerous nail holes and a strainer made of tin fits into the bottom of each perforated biscuit or petrol tin. All soakage pits should be used on alternate days to help the drainage problem (fig. 2). If these pits are to function properly attention must be paid to the following points:

![Fig. 2.](image-url)

Urine soakage-pit with concrete seal, fly-proof cover and sand surround.
(a) The digging of embrasures and the loosening of the soil at the bottom of the pit and careful grading of the stones which fill it. If not carefully supervised one frequently finds the Pioneer Corps or R.A.M.C. fatigue parties put the small stones at the bottom and the large boulders at the top of the pit! More waste of time and labour.

(b) That the oiled sacking fits carefully from two feet beyond the sides of the pit to close to the sides of the strainer tin. If there are gaps in between the pieces of sacking then part of the earth seal often works its way into the soakage pit and helps to block it. In fact seals the pit in the wrong place! Oiled sacking should therefore overlap.

(c) That the wooden lid over the strainer tin should be loose fitting with long sides and be fitted with a handle, preferably of the flat variety. If not loose fitting, personnel and patients will not replace lids correctly and also wooden lids swell in wet weather. A reserve of lids should be kept.

(d) That the concrete “box,” which we reinforced with old Kramer wire, should not fit closely to the strainer tin otherwise once again lids will not be replaced properly.

(e) That there should be careful supervision of all soakage pits and good co-operation in their use by unit personnel. The addition of straw or hay to the strainer tin converts any of the soakage pits into grease traps which work well if serviced well and if the head of water is not too great. If strips of sacking are laid between the strainer tin and the concrete “box,” and hay or straw placed in this gutter as well as in the tin, then an even more effective grease trap results. In my hospital and unit kitchens the cooks service their own grease traps, change the straw frequently and burn the grease-laden straw in the Soyer stoves. If properly cared for such temporary grease-traps cause no offensive odour. In a M.E.F. desert hospital I commanded in 1941-42, if the cold-water grease traps were not cleaned out twice daily by a R.A.M.C. sanitary orderly and two Egyptian labourers then they became very offensive.

When used as sullage water soakage pits for the operating theatre they have proved most successful. Two pits, used on alternate days, have actually been in use for a very busy operating theatre for well over two months. They have given no trouble, are free from flies and have no offensive odour. This really is rather a severe test for two small soakage pits dug in the clay soil of Normandy.

To sum up some of the advantages of these concrete sealed soakage pits:

1. Not difficult to make; require no R.E. materials other than cement and the latter is not absolutely essential.
2. Easy to keep clean.
3. Require the minimum of maintenance.
4. Comparatively fool-proof if carefully used.
5. Should not fill up if there be heavy rain and flooding say in the kitchen area.
6. Do not become offensive if well maintained.

It is important that soakage pits be well sited for drainage and rested every other day.

For nearly three months thirty soakage pits have been in regular use in 74 (BR) General Hospital and they seldom get choked. If so, it has generally been due to some careless individual putting dressings, hay, etc., into the actual soakage pit.

They would be of little value in marshy land or in prolonged wet weather in a clay soil. The stones filling the pit should not be of sandstone which eventually crumbles away.

The amount of water available for patients and personnel during this period has been five gallons per head per day. I held the view that ordinary ablution water, potato water and even urine, if scattered over a wide enough area of pasture land, are dealt with adequately by weathering and do not attract flies to any appreciable extent. It’s the concentration which eventually becomes attractive.
Fig. 3 shows a small trestle expressly made for use with containers from Soyer stoves. One man can easily empty and clean a container on one of these trestles and this saves fouling the ground. The washings into a bucket are then emptied direct into a kitchen grease trap.

**FLY TRAPS OVER DEEP TRENCH LÂTRINES.**

In 1942 I trapped all brick-built deep trench latrines in my M.E.F. desert general hospital by sinking an oblique shaft at one end of each latrine into the actual latrine trench and placing an Ordnance type of box fly-trap over these shafts. The black curtains of this type of fly-...
trap were removed in order that the maximum amount of light should penetrate the dark latrine and attract flies breeding there. Although these shafts were set at an angle, many of the traps caught massive quantities of flies. My requirements in this type of box fly trap were large and later Ordnance could only supply box fly traps made from non-returnable petrol tins and wire gauze. I found these next to useless as they were too dark.

When 74 (BR) General Hospital arrived in Normandy in early July, 1944, we brought with us several rolls of muslin purchased in England from our hospital fund and this has turned out to be identical to surgical muslin. We tried to bring a supply of sodium arsenite with us but failed to obtain any. We forecast that there would be no breeding of flies in this climate under three or four weeks. Within four weeks of our arrival all our twelve compo-box-covered trench latrines for patients and personnel were trapped with improvised box fly traps made from muslin-covered wooden frames, with muslin-covered wire cones.

Although only one layer of muslin was used to cover these latrine fly traps they stood up to storms and heavy rains very well indeed and caught many flies. The traps were "flitted" at dusk every evening and one Pioneer Corps private carried out daily maintenance of all these compo-box-covered trench latrines. This entailed earthing up and sealing all holes in the latrine superstructure, repairing seats, keeping as much as possible the lids self-closing, and also sanding the entrance and area between latrine screen and seats to prevent too much mud adhering to the boots of patients and personnel during rainy weather.

The seat next to the latrine fly trap was nailed down and a "NOT TO BE USED" notice tacked over it (fig. 4). This was done to prevent anybody using this seat and leaning on the fragile fly trap.

The latrine entrance should be at the opposite end to the fly trap for protection of the trap and not as in sketch. Strangely enough there was no sabotage of latrine fly traps or of baited muslin covered fly traps placed in latrines or near kitchens. The first latrine fly trap functioned well for seven weeks before requiring maintenance for a small hole due to "fair wear and tear." Of course, they all required careful inspection daily and were "flitted" each evening.

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**Fig. 5.**

Suggested concrete covered deep trench latrine, with wire gauze box fly trap directly over latrine trench. A strand of wire over the fly trap retains it in position in high winds.
It is important that the latrine fly trap be set directly over the latrine trench and that the base of the cone be as large as possible.

The number of flies caught in one latrine type fly trap in use for seven weeks was 21,540. Other latrine fly traps had similar heavy catches of flies. These improvised latrine fly traps worked excellently.

Fig. 5 is a suggested concrete-covered deep trench latrine, with wire-gauze box fly trap outside the latrine superstructure. This entails making the trench longer. Practically the only wooden portions of this latrine are the seats, the lids and the thick beam "stops" to make the lids self-closing. Of the many varieties of "stops" I have seen, the thick wooden beam is the best. The wooden seats could be dropped into slots in the concrete. To make the drawing simpler a single-sided latrine has been shown as there was not room on the page to show a twelve feet deep trench! In practice this could be a twelve seats latrine. There would be less chance of the wood warping, no need for urine deflectors and the latrine would remain more fly-proof than those with more wood in their construction. If the ground surrounding the trench for a distance of four feet were dug up to a depth of six inches, the loose earth removed and a layer of oil spread over this area and the area immediately beaten hard with a "punner," then there would be no need to use oiled sacking as the whole area surrounding the trench could then be concreted. The area could, of course, be concreted for six feet all round the trench if so required to meet the specifications of the flooring and roof superstructure.

It is not considered that even the lustiest of maggots could burrow far through Normandy clay! The latrine shown in fig. 5, however, is suggested as being suitable for many soils in many climates. Few deep trench latrines remain fly-proof for long and they are often dangerous sources of fly breeding.

-IMPROVISED FLY TRAPS.

Fig. 6 illustrates our standard improvised baited box fly trap. The box and cone should be covered with two layers of muslin or surgical gauze as we found that wasps, when captured,
could force their way through one layer of muslin and thus render a fly trap unserviceable. The box can be removed from the cone if the catch is to be cleared or to examine any particular flies caught. Two "buttons" prevent the trap from being blown off the stand or "landing ground" which should be reasonably wide and painted white or whitewashed. Gum Arabic can be used as size when making up whitewash. The fly trap and landing ground can be moved about inside or outside a cookhouse or placed on a sundial type of stand. This latter is a useful type of stand when placing fly traps behind swill bins or in a corner of a latrine; not on a latrine. Of course, D.D.T. will probably make such traps obsolete but, well, we had no D.D.T. and were unable to obtain any.

We have used muslin-covered fly traps in 74 (BR) General Hospital near our cookhouses and latrines for many weeks and they have proved very successful. As a routine, of course, they are "flitted" each evening at dusk to prevent flies escaping from the traps during darkness. I found in the M.E.F. that part of a catch could escape during the night if not "flitted." The bait should be removed from under the trap when "fitting" the catch.

There are some interesting figures in comparing catches from latrine type fly traps, trapping flies breeding in deep trench latrines, and catches in baited traps sited near cookhouses.

(A) One latrine type fly trap = 21,540 flies caught in seven weeks.
(B) One cookhouse baited fly trap = 2,875 caught in seven weeks.

The catches in other latrine type and cookhouse type fly traps were approximately similar to those given here.

Fig. 7 is my idea of a similar improvised fly trap which might be useful under field conditions in the Middle and Far East if D.D.T. were not obtainable. It is considered that both sides of the windscreen should be painted black and the landing ground white. In the early part of the day the trap should be turned to the sun, but in very hot weather the windscreen should be turned to keep the trap in the shade. Thus, when the sun is killing off flies, this trap in the shade, if serviced with suitable food and drink, cannot help but catch flies. By the way, flies dislike the smell of fresh white paint so a freshly painted landing ground must have time to weather. It can equally well be whitewashed.

### Bait for Fly Traps.

It is regretted that one cannot bait even out-door fly traps with faces or pus from plaster cases. Both would make excellent bait. In the M.E.F. my stock bait was "fresh fish gone high." Sardines left out for days to get "high" were tried here but flies were not interested. There were no chicken entrails, no fish and no beer! Jam and syrup encouraged wasps so "fresh meat gone high" became our standard bait. As a bait it is attractive to flies, but care must be taken to trap maggots from such bait. It should be turned over daily as the surface exposed to the sun soon dries up and must be kept moist.

Fresh urine as a bait for flies is useless in temperate climates. I do not believe that flies, unless of some special species, are interested in fresh urine except when they are really thirsty. Of course, in hot climates flies quickly die without water but even then I wonder if flies really prefer to drink fresh urine to water! For years I have felt it hygienically "half-wrong" that a "Redcap" should charge a soldier who leaves a picture house with his bladder up to his umbilicus and urinates in the sandy desert. The victim may not know the whereabouts of the nearest urinal and, naturally, does not wish to wet his trousers!

The baiting and siting of fly traps are simple but require much supervision if fly traps are to function as such.

### Sanitary Equipment and Improvisation.

It is unfortunate that general hospitals and, it is presumed, many non-medical units, do not arrive in this theatre of war with sanitary equipment available for immediate use; that is, pending the arrival of their A.F. G.1098 equipment and pending the completion...
of deep trench latrines, Otway pits, soakage pits and incinerators. Picks, shovels and other tools have to be supplied by the R.E. and these are frequently in short supply. There is a limit to improvisation and an adequate supply of tools and materials is a necessity.

There was, in many cases, a long time lag between the arrival of a general hospital in Normandy and the completion of any R.E. services. This was not the fault of the R.E. who were at times short of tools and materials for the multiplicity of R.E. services they were due to complete.

It is essential that units be self-supporting in this early sanitation. In 74 (BR) General Hospital we packed picks and shovels in our unit transport which arrived at our hospital site one day before us. Beside muslin, we had purchased additional carpenters' tools in England and brought with us such items as nails, paint, numerous hospital and unit signs and even rat poison (barium carbonate).

Except for the loan of R.E. tools, the gift of a little hessian and cement, packing case wood from a R.S.D., waste oil, oil drums, pitch drums and scrap metal, mostly “scrounged,” and some nails purchased locally, this hospital was completely self-supporting in sanitation for over two months. In my opinion, with available Pioneer Corps labour and some extra material such as corrugated iron, wood and nails, we could have been self-supporting for an indefinite period. This is not an idle boast but a considered opinion.

To sit back and wait with folded arms for R.E. help and materials shows a deplorable lack of initiative. On the other hand, too much should not be left to improvisation and “scrounging.” The later a unit arrives in this particular area the harder it is to find materials with which to improvise in sanitation.

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