

AIR RAID PRECAUTIONS
HANDBOOK No. 2

(2nd Edition)

FIRST AID FOR GAS
CASUALTIES



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FIRST AID FOR GAS CASUALTIES

*Issued by the Home Office
(Air Raid Precautions Department)*



LONDON

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List of Air Raid Precautions Handbooks issued and projected

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- No. 2.**—First Aid for Gas Casualties (*2nd edition*) (price 4d., 5d. post free).
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A special Handbook is also being prepared for Householders.

In addition to these Handbooks, there is published a series of A.R.P. Memoranda dealing with various aspects of the organisation to be provided by local authorities for public air raid precautions services.

GENERAL PREFACE.

The series of Air Raid Precautions Handbooks (of which a list is given on the opposite page) is produced under the authority of the Secretary of State, by the Air Raid Precautions Department of the Home Office with the assistance of other Government Departments concerned.

The measures for safeguarding the civil population against the effects of air attack which these Handbooks describe have become a necessary part of the defensive organisation of any country which is open to air attack. The need for them is not related to any belief that war is imminent. It arises from the fact that the risk of attack from the air, however remote it may be, is a risk that cannot be ignored, and because preparations to minimise the consequences of attack from the air cannot be improvised on the spur of the moment but must be made, if they are to be effective, in time of peace.

For the purpose of the measures now to be taken, it must be assumed that the scale of attack would greatly exceed anything which was experienced in the last war, and would involve the use of high explosive and incendiary bombs.

The use of poison gas in war is forbidden by the Geneva Gas Protocol of 1925, to which this country and all the most important countries of western Europe are parties, and the Government would use every endeavour on an outbreak of war to secure an undertaking from the enemy not to use poison gas. Nevertheless, the risk of poison gas being used remains a possibility and cannot be disregarded.

The Handbooks are designed to describe a scheme of precautions which it is hoped would prove effective in preventing avoidable injury and loss of life, or widespread dislocation of national activities. The Handbooks will aim at giving the best available information on methods of passive defence against air attack, and will be revised from time to time in the light of future developments.

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INTRODUCTION.

The purpose of this Handbook is to provide information, of both a general and technical nature, required by first aid parties and the personnel of first aid posts to enable them to carry out their respective duties as part of local air raid precautions schemes.

It is also intended to be used by the first aid personnel organised by large undertakings, factories and business premises.

It is assumed that these persons will be fully acquainted with the contents of A.R.P. Handbook No. 1, which deals with personal protection against gas, and gives a general description of the nature and dangers of war gases.

For the convenience of the reader, certain parts of the information contained in Handbook No. 1 are repeated. But the two handbooks are complementary, and it is intended that they should be read and used together.

Full guidance on the diagnosis and treatment of gas cases will be contained in A.R.P. Handbook No. 3, which is being specially prepared for the medical profession.

CHAPTER I.

THE CHEMICAL SUBSTANCES DEALT WITH

1. Classification of Gases.

The following classification of the chemical substances likely to be met with under war conditions, which is that adopted in A.R.P. Handbook No. 1, is considered to be that most helpful to first aid personnel.

It is based upon the effects which these substances produce upon the human body, and not upon the chemical composition of the gases.

Each group may contain many members, which differ from each other chemically: but the members of each group have a similar action on the body, and produce similar first aid problems.

From the first aid point of view, the substances to be studied may be classified as belonging to the following groups:—

- (a) Tear gas.
- (b) Nose Irritant Gas.
- (c) Lung Irritant Gas.
- (d) Blister Gas.

Before going further it is well to remember that, whilst the term "gas" is retained because it is convenient and has become sanctioned by use, it is not an accurate description of the substances which are being studied. Some are actually gases, some are liquids, and some are solids. The one thing they all have in common is that they are more or less dangerous and poisonous.

The grouping being according to their action the group names are, to a large extent, self-explanatory. Thus, Tear Gases act upon the eyes; Lung Irritant Gases act upon the organs of breathing; Blister Gases burn and blister.

For completeness, one more group must be added—

- (e) poisonous substances met with in war but not actually used as offensive agents.

CHAPTER II.

WAR GASES OTHER THAN BLISTER GASES

2. Tear Gas.

Tear gas, as its name implies, acts upon the eyes. It produces acute pain, profuse outpouring of tears, and spasm of the eyelids.

The result may be serious interference with vision, even complete inability to see. But the effect is normally only of a temporary nature.

It is very important to remember that inability to see does not necessarily mean blindness. The members of this group of gases do so very little damage, either to the eye or to the sight, that the question must arise as to whether first aid is really necessary.

Viewed from the usual angle, early treatment of some physical injury, there is very little need for first aid. The protection of the eyes from the poison, either by removal to fresh air or donning a respirator, plus simple washing of the eyes with warm water, or some mild solution such as normal saline (one teaspoonful of salt to one pint of water), is all that is required. The effect will normally have entirely disappeared in a very short time.

But there is another, and most important aspect of these effects, and that is the psychological or mental side.

It does not require much imagination to realise that an individual afflicted with the symptoms given above is going to be very frightened, and it is here that the coolness and firmness of the trained first aid personnel, based on a thorough understanding of the situation, are of such great value: of value not only to the individual but to the community. Of value to the individual because it will quieten his fear of permanent injury. Of value to the community because an understanding that nothing serious has happened will enable

the casualties to be dealt with promptly and finally, and will prevent them from being evacuated to hospital. If they are not dealt with by the first aid organisations as requiring simple treatment only, they may occupy space in ambulances and in hospitals to which they are not entitled, and which will almost certainly be urgently needed for other and really serious cases.

As these tear gases produce their effects even when enormously diluted, it is probable that, if any cases occur at all, there will be large numbers—a fact which increases the importance of this aspect of first aid work.

Furthermore, individual fear easily grows to crowd panic, and panic is one of the most serious dangers of a gas attack.

3. Nose Irritant Gas.

This group presents much the same first aid problems as the Tear Gas group.

The symptoms produced are pain—of a rather sharp burning character—in the forehead, the nose, the face, the teeth, the gums, the throat, and the upper part of the chest, and possibly also attacks of sneezing and coughing.

A feeling of sickness, or even actual vomiting, sometimes accompanies these symptoms.

A special feature of exposure to this group is acute, and distressing, mental depression. A special watch must be kept for this symptom and it must be combated by a firm though kind attitude of cheerfulness.

In spite of the very real distress which must obviously be the result of so widespread an effect, little or no serious damage results. First aid treatment consists in attempts to lessen the pain and discomfort. Nasal douching with warm, weak, Sodium Bicarbonate solution (10 grs. to one pint) is sometimes helpful. Copious draughts of the same solution will help to relieve the vomiting, if present.

These substances are not really "gas" at all, but clouds of fine particles of solid. For this reason they are often described as "toxic" or "poisonous" smokes. Since the particles are so fine that the cloud is quite invisible to the naked eye, the problem of providing protection against them is more difficult. All respirators provided by the Government, or bearing the Government mark, will provide complete protection.

These substances, being solids and not gases, have a certain degree of persistence. This is chiefly noticeable in that the particles will cling to clothing, and to the hair, and entry into a warm room after exposure may cause the air of the room to become very unpleasant, though not dangerous in any way. For this reason it is recommended that, with respirators on, outer garments be removed and shaken in the open air if possible, before entering the house or first aid post.

Casualties from Nose Irritant Gas are of even greater importance from the "panic" point of view than the Tear Gas casualties, and for the same personal and communal reasons.

This aspect of the situation is strengthened by two factors, both of which are important. First, whilst the presence of these poisons is quickly appreciated, though not quite so instantaneously as the presence of members of the Tear Gas group, there is a very definite tendency for the symptoms to continue getting worse for some time after removal from the poisonous atmosphere.

This is very important. It will increase the fear of the individual and, if not fully understood by first aid personnel, will make more difficult the task of persuading the victim that no serious damage is to be feared. The second factor is that, as the symptoms may continue to grow worse after donning the respirator, the confidence of the wearer may be severely shaken. He may think that his respirator is leaking; he may even discard it, thus exposing himself to attack by other and more deadly gases which may be present at the same time.

All this, plus the fact that these materials act in extremely low concentration, makes the Nose Irritant problem very important from the first aid point of view.

4. Lung Irritant Gas.

In this group a problem of an entirely different order from that of the two groups so far considered has to be faced.

The members of this group produce very serious damage, which is dangerous to life itself.

The early symptoms, which will vary considerably both with the particular gas encountered and with the concentration, include spasm of the throat, cough, retching, and a feeling of tightness or constriction of the chest. There may be some blueness of the face, with increased rapidity of both breathing and pulse rates.

At some rather indefinite later period, sometimes quite soon, sometimes after a lapse of two or three hours or more, the symptoms of the damage to the lung begin to develop.

For this reason first aid is of great importance, and the main consideration is complete rest, particularly essential because some of the members of this group tend to have a delayed action, especially noticeable in Phosgene poisoning.

The immediate signs of this delay are a lessening of the early symptoms of coughing, retching and tightness in the chest, followed a few hours later by the development of the symptoms associated with severe damage to the lungs.

The result, from the first aid point of view, is that all casualties known to have been or even suspected of having been exposed to one of these gases should be treated as stretcher cases from the outset, and not allowed to walk, even if the person concerned stoutly maintains that there is very little the matter—as often happens.

All cases may suffer pain in the chest. In some there may be but little coughing, though in others it may be a prominent and distressing symptom. Great quantities of frothy fluid may be coughed up, and vomiting is frequently also present.

At this stage the patient is obviously seriously ill, and definitely a hospital case, and the treatment and nursing, which are complicated and difficult, consist, among many other things, in the continuous administration of oxygen gas to breathe.

The majority of the deaths which occur do so within the first 48 hours from the time of onset of the serious symptoms.

It should be noted that some Lung Irritants have also the properties of Tear Gas, but only if in strong concentration and as an effect additional to the chest and other symptoms detailed above.

Rest and warmth and early evacuation to hospital are the main points of first aid for these serious and dangerous casualties.

Artificial respiration must not be carried out on those patients. The lungs are seriously damaged, and in a water-logged condition. Artificial respiration is likely to do more harm than good, and may even be itself a cause of sudden death.

For the milder cases, who may be transferred to their homes in the first instance, rest, and instructions to send for medical assistance if not appreciably recovered after a few hours, is advised. When in doubt these milder cases may be retained in first aid posts for observation.

Lung Irritant casualties may be classified into three main groups according to their mode of onset:—

- (i) Acute, with violent onset.
- (ii) Acute, with insidious onset.
- (iii) Mild.

(i) Acute, with violent onset:—immediate coughing, choking, and spasmodic gasping for breath. Difficulty and pain on trying to take a deep breath.

(ii) Acute, with insidious onset:—example from late war experience*:—

During the night two companies of men were doing pick and shovel work in the front line. They were suddenly subjected to an accurate fire of gas bombs (probably phosgene) from trench mortars, at 3 a.m. The men marched back some distance, only three complaining of feeling ill. About 5 a.m. they had breakfast and after the meal a number vomited and complained of difficulty in breathing. Several others woke, after a short sleep, with similar symptoms. There were subsequently many serious casualties of whom some 18 per cent. died.

(iii) Mild:—example from late war experience*:—

The cloud came rapidly into the trenches, where coughing and spluttering were at once heard on all sides. Men suffered from exhaustion, with spasmodic attacks of coughing and an inclination to vomit. Later there was great weakness, loss of appetite but increased thirst. Cases also seen of headache, aching limbs, flatulence, diarrhoea. Sleepiness and lassitude were marked symptoms. No serious or fatal cases reported.

* Examples summarised from Official History of the War—Medical Services, Diseases of the War, vol. II, chap. XII.

CHAPTER III.

BLISTER GASES.

5. Characteristics of Blister Gas.

This is a group, the members of which possess certain special and peculiar characteristics. These characteristics are so important individually, and collectively produce so many difficult problems, that they are given below under five main heads.

First aid personnel are earnestly advised carefully to commit this list to memory. It is not claimed that every problem connected with this group can be solved by the direct application of any or all of the five heads set out. But it is definitely felt that serious mistakes are likely to be made unless the five heads are clearly grasped and completely understood, and unless their possible application to each individual problem is closely considered.

The outstanding characteristics of the group are:—

(1) *Persistence and power.*

Members of this group are normally liquids, and liquids of a somewhat oily consistency. Under the normal weather conditions of a temperate climate they are capable of persisting even up to three weeks if the original contamination was heavy, and if sheltered from the direct action of sunlight and wind. All this time the contaminated area is dangerous to anyone coming in contact with it, and, moreover, the liquid is giving off, slowly but continuously, a dangerous vapour.

So far as the power of these poisons is concerned it may be said that a drop no bigger than the head of a small pin is enough to produce a blister the size of a shilling, and exposure to a concentration of the vapour of the order of one part in one million of air for one hour is capable of casualty production, more particularly by its effect upon the eyes, which are peculiarly vulnerable.

(2) *Penetration: (a) of materials, (b) of the body.*

The power of penetration is an outstanding and important factor. It is a true penetration, or "soaking in", comparable to the soaking of ink into blotting paper, and is not an "eating in" as in the case of an acid. There is, indeed, no destruction of the material, and the ink-and-blotting-paper simile is good in that the penetration takes place in all directions, sideways as well as inwards. The power of penetration is almost universal, practically the only substances which will prevent it indefinitely being sheets of metal, glass, and highly glazed and resistant materials such as good quality tiles or porcelain. The human body gives no resistance to penetration.

(3) *Insidious character.*

By this is meant that, particularly in the case of Mustard Gas but less so with Lewisite, the presence of the material is not very obvious, either by smell or by producing any particular sensation such as burning or smarting.

(4) *Delayed action.*

An important peculiarity is that whilst the actual damage takes place rapidly the recognisable evidence of this damage does not appear for a considerable time. Thus an individual can be contaminated without knowing it (insidious character) and may show no signs of damage from the contamination for as long as 24 hours. The average time, however, of development of clinical signs or symptoms is about four to eight hours for Mustard Gas, but rather sooner in the case of Lewisite.

(5) *Universal action.*

Unlike the members of the other three groups, so far considered, which have an effect normally confined to certain areas of the body, the members of

this group have the power of burning and blistering *any area* with which they come in contact, either as liquid or as vapour, whether within the body or on the surface.

6. Injuries produced by Blister Gas.

The damage produced by the members of this group varies somewhat with the particular area affected, though they have the general basic effect of burning or blistering. Taking the areas of the body in the order of their relative sensitiveness or liability to injury, the damage shows itself as follows:—

(1) *Eyes.*

Very liable to injury, whether from liquid or vapour, or both. Though there is some delay in the development of the damage this delay is less marked than in other areas of the body.

A few hours after exposure inflammation (conjunctivitis) sets in, with smarting, watering and finally closure from swelling of the eyelids. Conditions rapidly get worse, there is much pain, especially on exposure to light (photophobia), with discharge coming from between the swollen lids and trickling over the reddened and possibly blistered cheeks.

Actual destruction of the eye, and consequent blindness, is rare. Some impairment of vision may result from scarring left behind after healing, especially if the case has not been skilfully treated and nursed.

Should actual drops of liquid fall directly into the eye immediate irritation is produced. This effect passes off, to be followed an hour or so later by the rapid development of the above signs and symptoms. The effects are, in these cases, very severe, and destruction of the eye, with, of course, blindness, frequently follows.

(2) *Respiratory system.*

Inflammation of the throat and the windpipe, as a result of breathing air contaminated by the vapour which these liquids give off, is fairly common. It

produces a dry and burning mouth and throat, with a harsh, ringing cough, very characteristic and distressing. Laryngitis, with consequent partial loss of voice is common. In cases unprotected by a respirator burning of the lungs, followed by bronchitis and possibly pneumonia, with rising temperature and quickened pulse ensues. This can only result from long exposure to concentrations of vapour, without the protection afforded by the respirator. When it does occur it is serious, and dangerous to life.

(3) *Digestive system.*

Inflammation of the stomach, with pain and vomiting, does occur. It is the result of swallowing contaminated saliva, or of the ingestion of contaminated food or drink. It does not prove serious as a rule, unless the contamination was by actual liquid, when the results might be very serious.

(4) *Skin.*

Injury to the skin develops in three stages—reddening (erythema) with a fine rash not unlike nettle rash, blistering, and finally ulceration. How far the casualty progresses to the final ulceration depends on the original concentration and on the time of exposure to the poison.

The areas of skin most likely to suffer are those which are normally moist, such as the bend of the elbows and knees, the armpit, the crutch and inner side of the thighs.

The genitals also are particularly liable to attack.

If the affection is widespread there is frequently much mottling of a brown to purplish colour; and a brownish staining often persists for some months after healing has taken place.

More or less scarring persists after the healing of these ulcers, but the scars are soft and supple and permanent disability as a final result of external damage is rare.

In general it is true to say that, while the number of casualties is high, due chiefly to insidiousness and persistence, the death rate is low—about 2 per cent. in the late war.

7. First Aid for Blister Gas.

With the foregoing statements clearly in mind, and not forgetting the five special characteristics of this group enumerated in Section 5, the problems of first aid can be considered.

Before doing so, however, it is well to be quite clear that this is one of the cases in which "first aid" is entirely different from "treatment".

Further, it must be understood that first aid itself is more properly divided here into two heads, (a) first aid proper; (b) preventive treatment. This peculiar sub-division is due to the factors of "insidiousness" and "delayed action," as will become apparent later.

(1) *Eyes.*

The only first aid for Blister Gas in the eyes is free washing, with either plain warm water, normal saline, or Sodium Bicarbonate solution about 10 grains to the pint. The points of importance are that the washing should be free, best done with some form of douche-can with rubber tubing and a nozzle, and that it should be carried out at the earliest possible moment after contact. A little vaseline smeared gently over the edge of the lids, or better still a drop or two of liquid medicinal paraffin in the eye, will help to prevent the lids sticking together if inflammation should occur in spite of all efforts. It must be remembered that the eyes are very susceptible to both vapour and liquid.

(2) *Breathing passages.*

Cases in which signs and symptoms of damage to the breathing passages have developed, including the mouth and throat, scarcely fall within the province

of first aid. Damage to these parts generally means that the individual has been exposed to a relatively high concentration of vapour for a considerable time. The case is likely to prove a serious one, indeed most of the deaths that occur are due to the results of lung damage, and should immediately be transferred to hospital for expert medical attention. The hard, dry, "brassy" cough, so characteristic of this condition, is one of the earlier and more easily recognised symptoms, as is the laryngitis and consequent loss of voice which has been already mentioned.

(3) *Digestive system.*

These cases are characterised by pain in the stomach and vomiting. This can be temporarily relieved by draughts of warm Sodium Bicarbonate solution, 10 grains to the pint. But here again there are definite chances that the damage may turn out to be severe, and the cases require immediate hospital treatment rather than first aid ministrations.

(4) *Skin.*

When the skin is considered, then the above-mentioned sub-heads, called for convenience of description "first aid proper" and "preventive treatment," become of importance, and must be clearly grasped. Their importance, and the fact that there is any such sub-division at all, is based on the following facts.

There is a delay of some hours between the time that the poison comes into actual contact with the individual and the time at which he develops recognisable signs or symptoms of damage. Yet, in fact, the damage has begun almost immediately, and the delay is in development rather than in occurrence.

If skin, to which Blister Gas had been applied a few minutes earlier, be examined under a microscope, this early damage to the tiny individual living cells of which the body is built can be seen. What happens is that the poison sinks rapidly into the skin, owing to its power of penetration and to the fact

that it is freely soluble in fat, and then spreads, like ink into blotting paper, as mentioned above.

It damages at once the superficial area with which it first comes into contact, but it takes time for this damage to spread far enough to produce the final results of redness (erythema), blister, or ulcer.

The important points from the first aid point of view are:—

(i) Whether the time which has elapsed since contact is such that penetration of the skin is so deep that it is already too late to prevent injury developing?

(ii) How can the action of the poison be arrested?

The points have been put in the order of their importance. Throughout the first aid for Blister Gas *time* is the deciding factor. It is relatively easy to stop the action of the poison if first aid can be applied soon enough.

It must be quite clearly understood that these problems of first aid for Blister Gas differ, slightly but definitely, whether the liquid itself or the vapour from the liquid is being considered. Also, the difficulties produced by "Insidiousness" and "Universal Action" must be borne in mind.

There are, in effect, two possible lines of action; one is to destroy the poison by means of an antidote, and the other is to remove it by mechanical means, wiping or washing it away, before it has had time to penetrate too deeply.

The time actually available before penetration beyond the reach of first aid is very short. If damage is to be entirely prevented, and if the poison has reached the skin in the liquid form, the first aid must be applied in less than five minutes. In the case of contamination by vapour this time is definitely longer, and the combined effect of concentration and

time is the deciding factor—as in all cases of poisoning by chemical warfare agents. The lower the concentration the longer the time of exposure required to produce damaging results, and *vice versa*.

The application of an antidote seems to have a quicker and more thorough action than mechanical removal, and this is therefore the best choice for cases in which there are actual drops or splashes of liquid on the skin.

The only really efficient antidote, an antidote which will rapidly reach, kill, or make the poison harmless, and which is at present available, is Chlorine in some form or another.

Bleaching powder (that is, chloride of lime) is the best known and most generally useful form, and for skin contamination it can be used as a paste or an ointment. The paste is made by adding small quantities of water to special tropical bleach and stirring continuously until a paste of a consistency of thick cream is obtained; this will usually be achieved by the use of equal volumes of bleach and water. The ointment is made by mixing two parts of bleaching powder with one part of vaseline, preferably white vaseline.

Cover the contaminated area and the immediately surrounding skin with bleach ointment or paste, rub well in for about a minute and then remove, by wiping with a dry rag in the case of the ointment, and by washing off with plain water in the case of the paste. A subsequent bath with soap and water is desirable if it can be given.

Care should be taken to prevent the bleach getting into the eyes. Should it be possible actually to see liquid blister gas on the skin this should be rapidly wiped off with a rag before the antidote is applied. The now contaminated rag should then be burnt, or otherwise disposed of.

This is true first aid: it must be applied within a few minutes of contamination occurring, and, in practice, is only for those cases in which known contamination of skin by liquid mustard gas has occurred. But, owing to the insidious character and the persistence of the poison, the great majority of the cases of contamination will not be of that class at all. They will be cases who know, or think, they have been splashed but have no very clear idea of just where. Or they will be cases in which the clothing has become contaminated, either directly or by coming into contact with some infected person, thing, or place. Or they will be people who have been in an area where the vapour was present.

With regard to contamination by liquid through clothing it is important to remember that only vapour reaches the skin, unless the contamination is so gross as to soak the clothing and wet it right through.

In all these cases, whatever procedure is adopted, it must include the removal of all clothing and the treatment of the whole body. Firstly, owing to persistence, anything contaminated remains a danger until decontamination has been carried out; and secondly, owing to universal action, any and every part of the body is open to attack.

Therefore, for this class of case the method advocated is mechanical removal, by means of thorough washing with ordinary soap and warm water.

But this is not true first aid. It obviously cannot be carried out on the spot. Somewhat elaborate provision is required. For these reasons the procedure is best thought of, not as "first aid" but as preventive treatment, and special places must be arranged for it—as will be described later, in Chapter VI.

Summary.

(a) The essence of first aid for Blister Gas is prompt action.

(b) True first aid, for direct contamination—ointment within a few minutes.

(c) Preventive treatment, for indirect contamination—stripping and complete washing at the earliest possible moment, with or without the use of bleach paste.

(d) Keep the contaminated, whether persons or things, away from the uncontaminated until the proper cleansing procedure has been carried out.

(e) The contaminated clothes must be dealt with, whether they are known to have been contaminated or whether, owing to insidiousness and persistence, contamination is only suspected.

The clothing must be collected into receptacles, preferably metal bins with close-fitting lids, in such a way that they will not be a danger to others. It must then be dealt with in the appropriate way by the decontamination of clothing section of the local A.R.P. organisation.

8. Notes on Mustard Gas and Lewisite.

The two chief members of this group of Blister Gases are Mustard Gas and Lewisite. They each possess the general characters of the group, but they differ in certain rather important details, and it is convenient to list those differences here, though there is no essential difference in first aid.

Mustard Gas.

1. Entirely insidious.
2. Has a feeble and not very definite smell.
3. Produces no immediately appreciable effect upon any part of the body (unless a drop gets into the eye, when a mild irritation will be felt).

Lewisite.

1. Presence fairly obvious.
2. Has a strong and definite smell of geranium.
3. The vapour, if breathed for a few moments, produces an intolerable sensation of burning and irritation in the nose; the liquid produces a sharp tingling in contact with the skin, and immediate severe pain if a drop falls in the eye.

Mustard Gas.

4. Cold or warm water has practically no effect except after long periods of time, i.e., days or weeks, but boiling water destroys fairly rapidly.

5. Is rapidly acted upon and destroyed by bleaching powder.

6. Is extremely persistent.

7. Has a low death rate production figure.

8. Blisters should not be broken.

Lewisite.

4. Contact with water at any temperature rapidly destroys.

5. Bleaching powder has little effect, except that the water of a solution or paste will destroy—see 4.

6. Not so persistent, very largely because of the action of water.

7. When the skin has been heavily contaminated symptoms of arsenical poisoning may accompany those caused by burning.

8. Blisters should be broken because they contain arsenic.

9. Treatment of Developed Damage.

Treatment of developed damage is rather a matter for the doctor than for first aid. But late cases may find their way to a first aid post and the following hints are intended for guidance in the management of such cases pending their transfer to hospital, or in cases so mild that transfer is not necessary.

The first stage of skin burning, i.e. erythema (rash) without blistering, is extremely irritating, and is apt to produce considerable exhaustion from loss of sleep, because the intolerable itching tends to come on most

at night. This itching is very difficult to treat, but the free application of any of the following solutions can be tried:—

Potassium permanganate: 1/10,000.

Tincture of iodine: a few drops to $\frac{1}{2}$ pint of water.

Sodium bicarbonate: saturated solution.

Lotio calaminae.

Any evaporating lotion.

After free swabbing of the area, and light drying with a soft towel, plenty of dusting powder should be applied. For this purpose a simple preparation should be used, such as:—

Zinc oxide	}	equal parts.
Starch		
Boric Acid		

If a case is met with in which blisters have developed every effort should be made to preserve these blisters unbroken until the case can be handed over to a hospital.

If, however, it is known, or suspected, that the blisters have been caused by Lewisite then they should be opened and the blister-fluid evacuated at once under the usual surgical cleanliness. The reason for this is that Lewisite contains arsenic, and there is a possibility of general poisoning through absorption from the blister fluid.

In the case of eye damage, the patient will find comfort from the use of an eyeshade, but bandaging of the eyes should on no account be permitted.

CHAPTER IV.

OTHER POISONOUS SUBSTANCES

The substances dealt with in this chapter are not likely to be used as offensive agents, but are liable to be encountered under peace or war conditions.

10. Carbon Monoxide.

This gas is produced when certain materials burn under circumstances in which the supply of air or oxygen is restricted. It is one of the gases liberated in the explosion of high explosives, it is given off in the exhaust gases of motor engines, and a considerable proportion is present in ordinary coal gas. It forms the deadly constituent in the so-called "after damp" which is formed in a colliery explosion.

The following are typical instances of its occurrence:—

- (1) In the interior of burning buildings.
- (2) When a coke brazier burns in a badly ventilated room.
- (3) When the engine of a motor car is allowed to run in an ill-ventilated garage, or when, owing to a faulty joint, the exhaust gases gain entrance to the interior of a closed motor vehicle.
- (4) When coal gas escapes into an occupied room. During war, gas mains or pipes may be fractured by bombs and the escaping gas may penetrate into an adjoining house.

N.B.—A mixture of coal gas and air is highly explosive. Never use a naked light when investigating a supposed leakage of gas.

- (5) When the fumes of a high explosive shell or bomb which has burst underground penetrate into a cellar or the interior of a building, or when a shell or bomb bursts within a building.

Carbon monoxide is non-irritant and is particularly dangerous because the onset of symptoms may not be recognised in time to allow of retreat to safety.

The respirator gives no protection against carbon monoxide.

Symptoms.—When air containing a small proportion of carbon monoxide is breathed, the first effect is giddiness and loss of power in the limbs. In some cases there is also a period of marked mental excitement. Continued exposure to the gas may cause unconsciousness and death.

Treatment.—The poisoning effect of this gas is due to its being easily absorbed by the blood, where it seriously reduces the capacity of the blood to carry oxygen. The first essentials of treatment are therefore the removal from the poisonous atmosphere into pure air, and the avoidance of any exertion, which would increase the requirements of oxygen. If the breathing threatens to fail, artificial respiration must be employed, and oxygen (or oxygen containing 5 to 7 per cent. of carbon dioxide) should be administered.

In all cases the usual "anti-shock" steps must be taken, particular attention being paid to the provision of rest and warmth.

A close watch must be kept on the patient after restoration to consciousness as relapse is not infrequent, and if this is not treated death may ensue.

11. Nitrous Fumes.

These are produced in the course of various chemical processes, but more particularly through the burning of cordite.

Symptoms.—The first symptoms at the time of exposure are slight irritation of the nose and throat, together with an irritating cough, headache and possibly vomiting. These symptoms soon pass, and a latent period of some hours follows during which the patient feels quite well. In cases of serious poisoning acute symptoms of a similar type to those referred to under Lung Irritants follow the latent period.

Treatment.—In these cases immediate removal to hospital for medical attention is essential.

12. "Paralysing" Gases.

There are two gases coming under this head which might be met with in war. They are:—

Hydrocyanic (Prussic) Acid.

Sulphuretted Hydrogen.

Both have already been used in war, but with little success. Nevertheless, improved methods of employment might bring them back into use.

Moreover, Sulphuretted Hydrogen gas is sometimes present in the air of sewers in sufficient concentration to be dangerous. Leakage into cellars or houses as a result of air raid structural damage might possibly occur.

Hydrocyanic acid has the smell of bitter almonds, whilst the smell of Sulphuretted Hydrogen is that of rotten eggs.

Both gases need to be in rather strong concentration before the danger point is reached, but, in addition, a chronic form of poisoning from repeated small doses of Sulphuretted Hydrogen is possible, though hardly likely.

Sulphuretted Hydrogen is highly inflammable and when mixed with air will explode if it comes into contact with a naked flame.

Hydrocyanic Acid is lighter than air, Sulphuretted Hydrogen is heavier than air.

In a case of acute poisoning by strong concentrations of either of these gases the onset is sudden and serious.

Symptoms are ushered in by uneasiness and dizziness, rapid heart beat and breathing. Unconsciousness and convulsions follow rapidly, and death occurs through paralysis of the respiratory centre and failure of the respiration.

Treatment must be immediate. Prompt removal from the poisonous atmosphere, artificial respiration with, if possible, the administration of oxygen. A valuable addition to the oxygen is 5 to 7 per cent.

of carbon dioxide. This latter stimulates and increases respiration and so helps to flood the lungs with the oxygen and wash out the poison from the blood.

The patient must, of course, be kept warm.

The respirator gives a satisfactory degree of protection against both these gases.

13. Trinitrotoluene (T.N.T.).

Poisoning by this substance may occur in chemical works or munitions factories. The poison may be absorbed by inhalation and also through the skin, and the ill-effects produced are as follows:—

- (a) Inflammation of the skin.
- (b) Digestive disturbance.
- (c) Jaundice.

The poisoning will be progressive and the only first aid treatment possible is removal from the source of contact with the T.N.T.; rest and medical attention are required.

It is worthy of note that young adults are particularly liable to the development of jaundice: that this is frequently the forerunner of dangerous and even fatal illness: and that this symptom must therefore be carefully watched for, and its discovery followed by immediate removal from work entailing contact with this chemical.

14. Phosphorus Burns.

White phosphorus is used as a smoke producing material and may be scattered from shell, or bombs. The solid particles catch fire when exposed to air. If these particles land on clothing, or come into contact with the skin, they will cause severe burns. Clothing on which phosphorus is burning should be ripped off, and where phosphorus is burning on the skin, air must be excluded by immersion in water,

or the application of wrappings, preferably wet. Great care must be taken to remove all phosphorus from the burn. Phosphorus melts at 112° F., so that if the part is immersed in warm water the molten substance can be removed under water, or wiped off with a gauze sponge held in a forceps. Great care should be taken to remove every particle. Subsequent treatment is similar to that advocated for ordinary burns, but oils or fatty dressings should not be applied unless it is certain that all the phosphorus has been removed.

A first aid method advocated by American writers is to cover the affected area with a 3 per cent. solution of Copper Sulphate (Blue-Stone), or with rags soaked in the solution. The action is to coat the phosphorus with an inert compound produced by reaction with the solution, and so to put a stop to the burning.

CHAPTER V.

A.R.P. CASUALTIES ORGANISATION.

15. General Scope of Organisation.

The treatment of gas casualties will be part of the duties of the general organisation responsible for civilian casualties.* A large measure of elasticity is essential therefore in preparing schemes, and in planning the arrangement of first aid posts, to ensure that they are adequate to meet whatever situation may arise.

This handbook deals principally with the effects of gas, but it may be extremely difficult, if not impossible, in the first instance to separate gas casualties from those due to other causes. Persons who have been injured by splinters or falling masonry may also be contaminated with persistent gas, and will continue to be a danger to themselves and others until action is taken to get rid of the contamination.

Again, if persistent gas is used in any quantity there will probably be large numbers of persons otherwise uninjured, who will require cleansing treatment. Individuals whose clothing has been contaminated by persistent gas should remove the clothing, wash thoroughly and completely, and change into fresh clothing, *as quickly as possible*. If these precautions can be carried out within about 20 minutes of the initial contamination serious injury may be avoided. Moreover, the risk will be much reduced if outer garments, overcoats, wraps, mackintoshes, jackets, etc., which are known to be contaminated are removed *immediately*.

These measures can be taken at home, under the precautions recommended in A.R.P. Handbook No. 1. To meet the case of those who cannot get home and

* The organisation of this service is described in A.R.P. Memorandum No. 1.

obtain the necessary treatment quickly, within 20 minutes at most, public facilities will be provided at first aid posts.

It is not anticipated that these posts will be called upon to deal with large numbers of persons who require immediate and extensive surgical treatment. Such cases should be taken by ambulance direct to casualty clearing hospitals. These hospitals will need their own arrangements for dealing with contaminated casualties.

Thus the general organisation is:—

- (1) first aid parties;
- (2) first aid posts within easy access of any casualty;
- (3) casualty clearing hospitals;
- (4) base hospitals;
- (5) ambulance service working with and connecting up the various parts of the organisation.

Casualty clearing hospitals, which are intended for the first hospital reception of casualties, for their sorting, and for giving immediately urgent medical or surgical treatment, must obviously be situated in centres of population, that is within possible danger zones, and cases must be evacuated from them as soon as possible to other, and less exposed, hospitals.

Those latter hospitals are called base hospitals. In them any further treatment required can be given. They should therefore be situated outside the immediate danger zone, that is in less densely populated areas and in areas less liable to attack.

16. How to Detect Gas Casualties.

The first requirement is to decide quickly who are gassed and who are not, and the second, which group of poisons is concerned.

Many may think that they have been gassed, but it does not follow that they have received injury or require treatment. They may be entirely mistaken, or they may have smelt a trivial concentration. It is

often difficult to reach a decision, but the following facts should be borne in mind.

The effects associated with the various groups of chemical warfare agents are reasonably definite. They must be closely studied, comparing one group with another, clearly understood and carefully memorised.

In the light of this knowledge a rapid examination and questioning of the patient will often give a clue to the answer. A final decision will frequently rest on a combination of negative with positive observations. That is to say, the *absence* of certain facts, whether observed or elicited by questioning, plus the *presence* of certain other facts will often be of great assistance. Doubt might arise, for instance, as to whether a certain casualty were suffering from the effects of tear gas, or lung irritant gas. The *presence* of lachrymation might be due to exposure to tear gas or to a strong concentration of lung irritant gas; but if other symptoms, such as coughing and tightness of the chest, were *absent*, this would be strong evidence in favour of a diagnosis of simple tear gas infection.

In general it may be said that the detection and differentiation of gas casualties depends on a consideration of one or more of the following points:—

- (i) smell or other indications of gas (splashes);
- (ii) clinical signs and symptoms of casualty;
- (iii) the casualty's own statements.

A careful study of the Table of Gases in the Appendix is recommended.

Whenever there is doubt the benefit must be given to the casualty. It must then be accepted that he has been gassed, and the requisite steps taken accordingly.

Only cases in which there are definite reasons for assuming exposure to gas should go to the first aid post. Others should be advised to return quietly to their homes and lie down, and to obtain medical advice if not completely recovered in a few hours.

Personnel of the first aid parties must take every care to avoid becoming casualties, either by contact of themselves or their clothing with places or things contaminated by persistent gas, or by breathing air containing poisonous vapour coming off the clothing of their patients. They must use their own judgment with regard to the wearing of respirators and protective clothing.

When it is definitely known that persistent gas has been used in an area it is essential that the respirator and suitable protective clothing should be worn. If only non-persistent gas is suspected, the carriage of the respirator in the "Alert" position, ready for instant donning, may be a sufficient precaution.

17. Handling of combined Gas and Wound Casualties.

There may be cases of persons who have received injuries necessitating first aid and who are also casualties from, or contaminated by, gas.

If chlorine or phosgene (lung irritant gas) poisoning is suspected, convey the person on a stretcher as quickly as possible to the ambulance: keep him warm whilst doing this and loosen the clothing round his neck.

Should the patient's clothing smell strongly of any gas, the outer garments must be removed and the person wrapped in a blanket or other covering before removal.

In all such cases of contamination an oilskin sheet should be spread over the stretcher before lifting the patient on to it. Oilskin gloves and other suitable protective clothing should be worn by the first aid personnel before handling the casualty.

When moving through a gassed area care must be taken to adjust the respirator on the casualty, whether he be a stretcher case or no. (See end of Appendix B to A.R.P. Handbook No. 1 for instructions how to do this.) In the case of head injuries it is often possible

to use the facepiece and the head harness elastics in lieu of a bandage. By doing this, where possible, the distortion, and consequent danger of leakage, resulting from an attempt to apply the facepiece over both dressing and bandage can be avoided. Failing this, the facepiece can be placed over the patient's face, the head-harness being brought over to the front.

This is nothing more than a desperate remedy to meet a desperate case. Naturally it will be almost impossible to keep the facepiece close enough to the face to make a gas-tight fit. Yet, as a purely temporary expedient when no other course is possible, the small amount of protection given may be better than none at all.

A decision will have to be made whether to send the casualty to a hospital or to a first aid post. Cases appearing to require immediate surgical attention should be sent to hospital by ambulance. Minor injuries, including even simple arm fractures, and gas cases unless severe, should be sent to the first aid post for removal of the gas contamination, because the facilities for this latter at hospitals will necessarily be limited and the staff fully occupied with serious surgical cases.

The public should be advised not to apply for treatment at hospitals. They will receive more prompt attention by going to a first aid post.

As far as possible, the first aid dressings applied to casualties when first picked up should be of such a nature that they will not interfere with the removal of the clothing, and that no re-dressing will be necessary before the bathing or washing of the patient.

As soon as a patient is received at the first aid post or hospital, his contaminated clothing should be removed, cutting away being resorted to if necessary. Such first aid or surgical attention as is *immediately* required should then be given, and the patient handed over for removal of contamination from his skin. After thorough cleansing he should be dealt with in the normal routine as for other surgical cases.

CHAPTER VI.

THE ORGANISATION OF A FIRST AID POST.

18. General Organisation.

An air raid precautions first aid post serves two purposes—to deal with casualties and to deal with contamination of persons by persistent gas, whether these latter are also “casualties” in the usually accepted meaning of the term or are only cases who may become casualties from the delayed action of the persistent gas.

For the sake of brevity in the title all mention of this second function has been omitted.

The purpose for which these combined first aid posts are required, then, is to deal with all minor casualties, which are not in need of immediate hospital treatment, and all cases of gas contamination in which serious injury has not already developed. In view, however, of what has been said in Section 15, the posts must be equipped and staffed for the treatment of any or all of the following cases:—

- (1) minor injuries caused by splinters from high explosive bombs, falling masonry, shock, etc.;
- (2) casualties due to non-persistent gases;
- (3) cases described under (1) and (2) which are also contaminated with blister gas;
- (4) cases which are contaminated with blister gas but which are not yet casualties.

It is obviously impossible to be dogmatic as to the total numbers or the numbers in each group. If some figures are required for practical calculation purposes estimates will be found in A.R.P. Memorandum No. 1.

The most important division is between the contaminated and uncontaminated, and the contaminated patients should be divided into those who are wounded and those who are not.

In addition to the accommodation actually required for first aid purposes and the cleansing of contaminated persons, it is desirable that there should be accommodation, either in the building itself, or close at hand, for the staff. One or more rest rooms, and a room in which meals can be served, should be available for the staff when off duty.

The plan of the lay-out given later indicates the rooms required for each stage of the treatment, and the direction in which casualties will pass through the post. It is suitable for either men or women, but the accommodation, staff and equipment will require duplication to provide for both sexes. It may not always be possible to accommodate all sections in one building. This is highly desirable, but if splitting up of a post over more than one building is unavoidable the separate buildings used must be within sight of each other.

The lay-out is meant to be used as a general guide on principles which can be applied in detail to, and adapted for, any particular building which is suitable from other points of view.

It is clearly desirable that the building selected for the purpose should be of a substantial nature, and one which can be made to give adequate protection against blast, splinters and gas.

It is essential to keep contaminated and uncontaminated personnel apart, and, in the case of the former, so to arrange the procedure that cleansed persons do not retrace their steps and come into contact with contaminated individuals.

It will be necessary to keep a record of the names and particulars of all cases entering and leaving the post. In many instances, also, valuables and other personal belongings will have to be handed in on arrival and collected on discharge or at some time later. For those reasons it will be a great convenience if a main office and stores can be arranged in a convenient situation.

19. The Sections for dealing with Contaminated Cases.

The reception and undressing room will be liable to contamination from the clothing of persons arriving for treatment (as shewn by the shading in Figs. 2 and 3), and for this reason will require regular and frequent decontamination. In an ideal construction this room would have the lower five or six feet of the walls lined with glazed tiles or bricks, and the floor of tiles or cement, provided with a drainage system to enable hosing down to be carried out. Cement or concrete should be treated with sodium silicate solution (one part of waterglass to four parts of water) to render it as non-porous as possible. A wooden floor is less suitable but may be improved if covered with linoleum. In emergency plain wood will serve if well scrubbed after use.

The walls will be less liable to contamination than the floor, and almost any type of wall will serve so long as it is washable. Plain plaster walls can be rendered more suitable by treatment with a silicate paint or washable distemper. Papered walls and woodwork can be similarly treated, or else varnished.

Outside the entrances to the "contaminated" sections there should be a projecting roof, or awning, under cover of which trays of bleaching powder and boot brushes can be placed. All contaminated persons should be instructed to discard their outer clothing in this outside space, and to treat their boots thoroughly in one of these trays before entering the post.

The average time allowed for uninjured persons for the complete procedure should be 30 minutes, made up as follows:—

Undressing less than 5 minutes.

Washing and drying . . . 10 minutes.

Examination and dressing 10-15 minutes.

The particular arrangements for each of the rooms in the section for contaminated unwounded are as follows:—

Reception-undressing room.

The accommodation here will need to be fairly ample to obviate the spread of contamination by jostling,

and to reduce delay to a minimum, as speed is of great importance.

Clothing must be removed as quickly as possible and placed in metal bins, with well fitting lids, to prevent the spread of contamination and the danger from vapour coming off the contaminated clothes.

Subsequently these bins and their contents should be removed to the appropriate centre, under arrangements made by the appropriate section of air raid precautions organisation.

In this room there must be a good supply of forms covered with American cloth for people to sit on whilst undressing. Forms are better than chairs but the latter can, of course, be used if necessary.

The attendants should be suitably protected by respirators, protective gloves and coats, as they may have to undress persons who are heavily contaminated.

Since free ventilation would be impossible if there were gas present outside, there is danger from vapour coming off from the clothes of casualties within the post. Reception-undressing rooms in the "contaminated" section must therefore be cut off by ceiling-high partitions and air locks unless the danger can be otherwise dealt with.

Washing Room.

The best arrangement is to have overhead shower-baths, which are very easily made by carrying a water pipe across the ceiling and fixing ordinary sprinkler roses at intervals. The necessary drainage must be provided. Tiled walls, with a tiled or cement floor, are naturally best. When the floor consists of wood, it should be covered with linoleum or lead which may conveniently be extended some distance up the walls. This may be placed on a false floor, raised some three inches and sloping into an improvised gutter. Hot, or at least tepid, water must be provided. Cold water should not be used owing to the risk of chills, and because it is less effective in removing contamination. Cases should

be instructed to wash themselves thoroughly all over with soap and water during the three or four minutes they are under the shower, particular attention being paid to those areas of the body most liable to damage (see Section 6).

Where bleach cream or ointment is ordered for local application, such treatment should take place before the patient goes under the shower.

Arrangements must be made in the bath rooms for the washing of eyes. This is best managed by fixing douche-cans, or other containers, to the wall at about shoulder height. The individual sits on a chair, a length of rubber tubing leads from the can to a nozzle and stop-cock, and an attendant rapidly washes out the eyes. Warm water, or any mild solution such as Sodium Bicarbonate, 10 grs. to 1 pint, may be used.

A clean towel will have to be provided for each person, *after he has washed.*

Dressing Room.

This room does not require to be constructed of any special materials, and it need not be so large as the undressing room because the people and the clothing will be free from contamination. But it must include arrangements for the supply of clean clothing.

Particulars of cases will be taken here by the clerical section of the post.

20. Section for dealing with Uncontaminated Casualties.

Beyond a study of the diagram of a suggested lay-out for first aid posts, and a thorough grasp of the important points associated with contamination by persistent gas, as that effects both the lay-out and the general management, there is little to be noted. In the absence of the complicating factor of contamination the usual rules of first aid organisation will apply.

It must, however, be remembered that these posts may be required to operate in a gassed area, when the outside air is dangerous. They should therefore be made gas-proof as well as splinter-proof. This entails amongst other things, provision of air locks at all external entrances and exits.

One of the great difficulties facing the local air raid precautions organisation will be the adaptation of buildings as first aid posts with sufficient rapidity in a time of emergency. Finding suitable labour may be a limiting factor. For this reason it would be very helpful if the first aid personnel allocated to man a particular post could assist in its adaptation, and with this object make themselves familiar in advance with the work which would have to be done.

21. Suggested Lay-Outs of Posts.

Diagrammatic representation follows of the three sections into which a first aid post should be divided. The three sections would have to be repeated to deal with casualties of both sexes. The sizes of rooms are given for what is described in A.R.P. Memorandum No. 1 as a "large post."

Section A—wounded and/or gassed (uncontaminated).

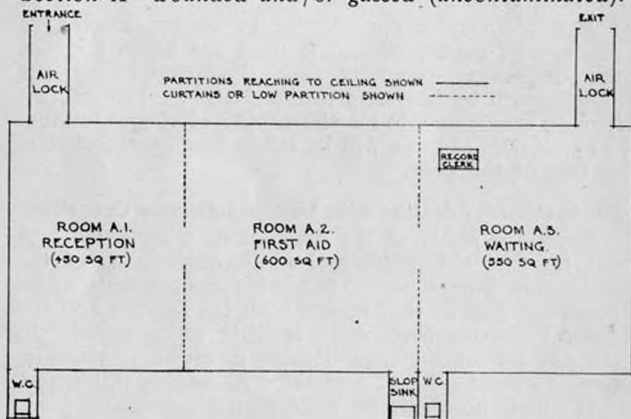


FIG. 1.—Lay-out of Section A—First Aid (Uncontaminated Casualties) for one sex.¹
 Sizes are given for a large Post.

This section, illustrated in Fig. 1, should be used to deal not only with injured persons, but also with those suffering from non-persistent gases.

Staffing and administration will be simplified if it can be arranged that the injured-contaminated receive first aid treatment in this section, after the contamination by persistent gas has been removed in the section next described.

Section B—wounded and/or gassed (contaminated).

This section, illustrated in Fig. 2, is more complicated because contamination must be removed before first aid proper can be given. As pointed out above, simplification can often be attained by careful planning.

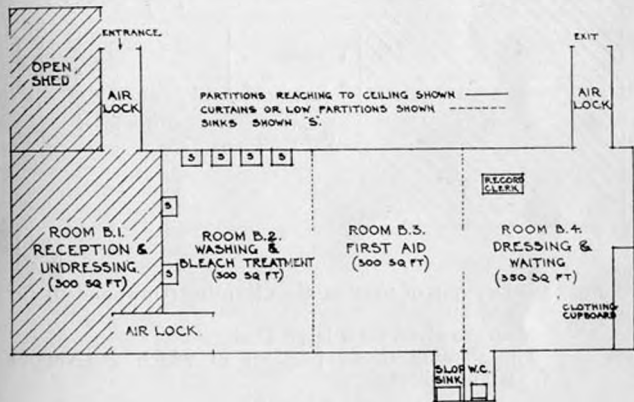


FIG. 2.—Lay-out of Section B—First Aid (Contaminated Casualties) for one sex.
 Sizes are given for large Post.
 The shading shows portions in which gas vapour might collect.

The wounded dealt with in this section will be unable to wash themselves, and the most convenient arrangement is that the washing room be fitted with sinks, at which or by which they can be washed by the staff. Warm water and floor drainage are necessary.

Section C—contaminated (unwounded).

This section is illustrated in Fig. 3. The main object is to avoid delays in the undressing room and to pass contaminated persons through the washing treatment as rapidly as possible.

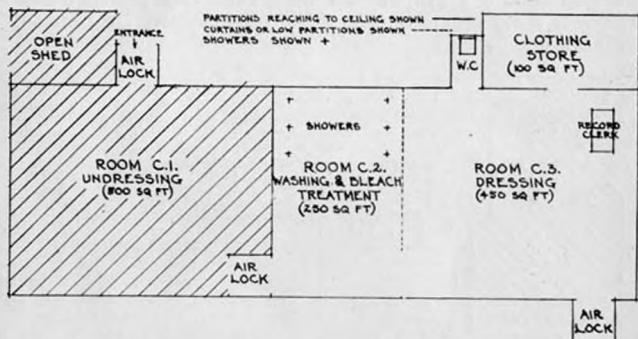


FIG. 3.—Lay-out of Section C—Cleansing (Unwounded) for one sex.

Sizes are given for a large Post.

The shading shows portions in which gas vapour might collect.

Three Sections combined.

Fig. 4 is intended to show a way, not necessarily an ideal or a standard way, in which the three sections might be fitted into one whole. This figure therefore represents a possible half—either for males or females—of a complete first aid post.

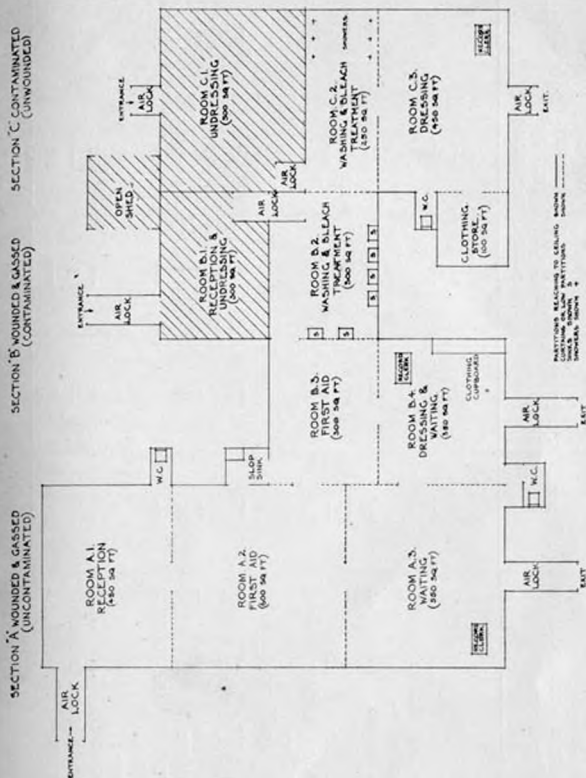


FIG. 4.—Lay-out of a First Aid Post for one sex, showing sizes of rooms for a large Post.
The shading shows portions in which gas vapour might collect.

Personnel for one half of a "large post"—*i.e.* for the accommodation for casualties of one sex.

Officers.

Office

I

Storeroom

—

Section A—wounded and/or gassed (uncontaminated)—

A1—Reception Room

—

A2—First Aid Room

—

A3—Waiting Room

—

Section B—wounded and/or gassed (contaminated)—

B1—Reception and undressing room

—

B2—Washing and bleach treatment

—

B3—First aid room

—

B4—Dressing and waiting room...

—

Section C—contaminated (unwounded)—

C1—Undressing room

—

C2—Washing and bleach treatment

—

C3—Dressing room

—

Total (one shift)

I

Storemen.	Fully trained first aid personnel.	Auxiliary trained first aid personnel.	Clerks.
— 1	— —	— —	1 —
— — —	2 2 —	1 2 —	— — 1
— — — —	1 1 1 —	2 2 1 —	— — — 1
— — 1	— 1 —	2 — 1	— — 1
2	8	11	4

22. Staff for a First Aid Post.

The table given on the opposite page is a suggested staff for one half (i.e. accommodation for casualties of one sex) of a "large" First Aid Post, as described in A.R.P. Memorandum No. 1. These figures are given for general guidance only. The precise requirements of each post will depend on its actual size and layout.

The table does not include auxiliaries such as furnace-men, doorkeepers, or domestic staff for the billets of first aid personnel.

The total staff *for each shift* in a complete post may therefore be summarised as follows:—

	Male side and general.	Female side.
Officers	1	1
Fully trained first aid personnel	8	8
Auxiliary trained first aid personnel	11	11
Storemen	2	1 or 2
Clerks	4	3 or 4
Doorkeepers	1	1
Furnaceman	1	—
Domestic staff	(as required)	

APPENDIX.

[§ 16

TABLE OF GASES.

Example.	Properties.	Effects.	Remarks.
Lung Irritant Gases — Phosgene (<i>non-persistent</i>).	A gas—almost invisible. Corrodes metals. Is rendered less effective by heavy rain. Smell of musty hay.	Highly lethal, due to damage to lungs. Symptoms: Cough and watering of eyes.	Respirator affords complete protection.
Chlorine (<i>non-persistent</i>).	A gas—greenish colour. Corrodes metals. Is dissolved in water. Will eventually rot clothing. Smell of bleaching powder.	Do.	Do.
Nose Irritant Gas — Diphenyl-chloroarsine (D.A.) (<i>non-persistent</i>).	A yellow crystalline solid which when heated gives off an almost odourless smoke. Generally invisible except near the source. Can still be effective although not visible. Recognised by effects, which are slightly delayed.	Produces sneezing; burning pain in chest, throat, nose and mouth; mental depression.	Do.

Tear Gases—
C.A.P.
(*non-persistent*).

A solid. Almost invisible in gaseous state. Recognised by irritation to eyes and nose.

K.S.K.
(*persistent*).

A dark brown liquid. Invisible in gaseous state. Recognised by irritation to eyes and nose.

Blister Gases—
Mustard gas
(H.S)
(*very persistent*).

An oily liquid which may vary in colour from dark brown to straw yellow. Soluble in oil and spirits. Neutralised by bleaching powder. Great power of penetration.

Smell of garlic, onions, horse - radish or mustard. Liquid may be seen.

Copious flow of tears and spasm of eyelids. Slight skin irritation.

Do.

Do., but no skin irritation.

Do.

(i) *Liquid.*

- (a) In eyes; immediate irritation, eye closed in about one hour.
- (b) On skin; no irritation, redness in 2 hours followed by blister in 12 to 24 hours.

Respirator protects eyes and lungs only.

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(ii) *Vapour.*

- (a) In eyes; irritation and inflammation with swelling and temporary loss of vision usually develop within 24 hours, but tears earlier if the vapour concentration is high.

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Example.	Properties.
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Effects.	Remarks.
(ii) <i>Vapour—contd.</i> (b) In lungs ; loss of voice and cough. Later possibly bronchitis and broncho-pneumonia. (c) On skin ; redness, irritation and perhaps blisters ; but to an unprotected man, the eye damage is worse than the lung or skin effects. The effect of swallowing food contaminated by liquid mustard gas is severe injury to stomach and intestines.	Respirator protects eyes and lungs only.
(i) <i>Liquid.</i> (a) In eyes ; immediate effect and permanent injury. (b) On skin ; blisters develop more rapidly than with mustard gas. (ii) <i>Vapour.</i> Causes severe irritation to nose. Hence respirator will be adjusted immediately so that there will be no permanent effects on eyes, nose or lungs. Is less effective on skin than mustard gas vapour.	Do.

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