Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

War Gases

Volume XIV | Friday, April 2, 1943 | Number 20

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

Volume XIV | Friday, April 2, 1943 | Number 20

INDEX

Published for the General Staff Meeting each week during the school year, October to June, inclusive.

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William A. O'Brien, M.D.

I. LAST WEEK

Date: March 12, 1943

Place: Recreation Room, Powell Hall

Time: 12:15 - 1:15 p.m.

Program: "Carcinoma of Oral Cavity"
Richard H. Beiswanger

Discussion
L. R. Boies
W. T. Peyton
K. W. Stenstrom

Attendance: 101

Gertrude Gunn,
Record Librarian

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II. COURSES

1. CENTER FOR CONTINUATION STUDY

Spring Program

Cancer Education	April 5- 7
Kenny Technique (M.D.)	April 12-17
Communicable Disease(Nurses)	April 15-17
Electrocardiography	April 26-28
Dermatology	April 28-30
Refraction	May 3- 8
Obstetrics	May 3- 5
Radiology	May 14-16
Home for the Aged	May 17-19
Kenny Technique (M.D.)	May 17-22
Obstetrics (Nurses)	May 20-22
Kenny Technique (M.D.)	June 1- 5
Tuberculosis (Nurses)	June 1- 3
Obstetrics and Pediatrics	June 7-12

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III. RADIO SERVICE

Speaker: William A. O'Brien, M.D.

1. MINNESOTA STATE MEDICAL ASSOCIATION

(15th Anniversary) Saturdays, WCCO, 10:15 a.m.; WLB, 11:30 a.m.

April 3 Cancer Diagnosis
April 10 Cancer Treatment
April 17 Cancer Research
April 24 Cancer of Oral Cavity
(Joint sponsorship with Minnesota State Dental Association)

2. UNIVERSITY OF MINNESOTA SCHOOL OF THE AIR, "YOUR HEALTH AND YOU"

W.L.B. and Mutual System, Wednesdays, 11:00 a.m.

April 7 Health Fads
April 14 Advertising and Health
April 21 Alcohol and Tobacco
April 28 Prevension of Communicable Diseases

3. MINNESOTA SOCIETY FOR CONTROL OF CANCER

April 12 Woman's Field Army, WCCO, 3:45 p.m.

4. AMERICAN RED CROSS NUTRITION COUNCIL

April 20 Food Infections, WTCN, 10:30 a.m.

5. MINNESOTA HOSPITAL ASSOCIATION

April 26 Cancer Treatment Facilities in Minnesota, WCCO, 5:15 p.m.

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IV. MEDICAL ASPECTS OF CHEMICAL WARFARE

L. W. Foker

The purpose of this paper is to present some of the medical aspects of chemical warfare. These remarks will be confined to what may be called the classical concepts of chemical warfare, since information regarding new gases is a closely guarded military secret. There is very little reason to believe, however, that there are new gases suitable for chemical warfare. The only gases recently introduced are the so-called "nitrogen mustards" which are similar to the old mustard gas.

The history of gas warfare is very old. The earliest attempt at the use of chemicals in warfare is cited by Thucydides in his accounts of the Peloponnesian War in the Fifth Century, B.C. During the siege of a city, faggots impregnated with pitch and sulfur were set on fire outside the city walls. The wind drove the smoke against the city and rendered one point of the defense untenable. However, a thunderstorm broke and extinguished the fire; thus the first gas attack on record was unsuccessful. Hannibal used poisoned snake "grenades." In 1726, Fleming in his book, The Perfect German Soldier, described several new poisons to be incorporated in grenades. Not much was heard of the use of chemical warfare until April 22, 1915, when the Germans launched their large scale chlorine attack along the Flanders' front, causing 15,000 casualties and 5,000 deaths. The success of the attack lay in the element of surprise and the total lack of preparedness by the Allies. This new threat was quickly met with, however. The first crude mas was immediately devised, and within three days, the troops at the front were supplied with 100,000 masks. In 1917, again the Germans first used "mustard gas" - another surprise.

With what appears to be such an effective weapon at hand, one wonders why more extensive use has not been made of it in the present conflict. The Italians used mustard gas dispersed by airplanes in the Italo-Ethiopian War and the Japanese are reported to have used mixtures of mustard and lewisite against the Chinese, otherwise only incendiary bombs and flame throwers are being used in the present war. The reasons for this are varied: first, there is the Geneva Protocol in 1925 abhoring the use of chemical warfare in the future; secondly, an element of surprise is necessary; and lastly, most of the belligerent nations are well prepared in both the offensive and defensive use of these materials. As an example of how the effectiveness of gas warfare is decreased with adequate defenses, it has been cited that during the final stages of the German retreat in Flanders 2 million rounds of gas shells containing 4,000 tons of mustard gas were fired against the British with 540 killed and 24,363 injured. Adequate defense progressed to the point where it required nearly 8 tons of mustard gas to kill a single man.

During the last war the Chemical Warfare Division of the United States examined some 4,000 substances, only 54 of which were tried in the field and 12 in use at the end of the war. At the present time, as far as can be determined the chemical warfare materials of the belligerent nations are the same as before. There is, however, always the danger that some new and powerful gas may be discovered which does not fall into the present categories of toxic war materials. The reason for the relatively few materials in use is that they must meet very exacting requirements to be effective. Some of these requirements are that they must have high toxicity, must be insidious in action, must be readily available, heavier than air, must be stable and capable of being liquified. Our Chemical Warfare Service states that so far "no agent is known which is more effective than mustard gas in sending men to the hospital; and there is little evidence that a gas more effective than phosgene is available for poisoning the air."

Military authorities are of the opinion that in this war gas attacks may be made upon the civilian population from the air. The object of any gas attack upon a civilian population is to destroy

morale, to inspire panic, force evacuation, disorganize industry, and produce casualties. It is thought, however, that the overwhelming of a capital city by gas is impossible. The menace from the air is reduced as anti-aircraft defenses are strengthened and training in air raid precautions and gas defense are improved.

It has been stated by authorities that the greatest menace of poison gas is in its fear inducing qualities. There has been too little effort made to dispel this propaganda-inspired fear of chemical warfare which is frequently shared by the non-informed physician. Chemical warfare is regarded as peculiarly fearful and diabolical by the public and by professional soldiers, while older forms of warfare with more horrible results are stoically accepted. The reason for this lies in the instinctive dislike and fear for what is mysterious and unknown.

James Kendall, Professor of Chemistry in the University of Edinburgh, in his book, Breathe Freely, points out that in the World War I, of 72,807 American casualties due to gas, only 2 per cent were fatalities, whereas of the 199,331 casualties due to other causes, 25.8 percent were fatalities. Much is made of the horrible "after-effects" of gas. It has been frequently stated that permanent blindness resulted from mustard gas. General Gilchrist, the Chief Medical Advisor of the Chemical Warfare Service of the A.E.F., has shown that of the 812 cases of blindness in the A.E.F., only 33 cases or 4 per cent were due to gas.

It has been repeatedly claimed that gas poisoning causes marked disposition toward tuberculosis. General Gilchrist points out that in the year 1918 there were one and one-half times as many cases of tuberculosis per 1,000 among all troops in France as there were among gassed troops, and in 1919, this proportion rose to one and three-quarter times as many cases. This is not intended to suggest that chlorine gas is an antidote for tuberculosis. Other factors such as the fact that persons with a marked tendency toward tuberculosis frequently fell sick before they reached the front lines must be considered. Colonel Prentiss, in his book, Chemicals in War, states that chemical warfare is the most humane method of warfare yet devised for man.

These facts are brought out not in defense of chemical warfare, but to point out that proper education of civilians and civilian doctors will do much to reduce casualties in the event of gassing of civilian centers and will greatly reduce that effect most desired by the enemy, namely, fear and demoralization of the civilian population. During a gas attack the layman will look to the medical man not only for the usual service and advice but also for leadership. He must be prepared to give intelligent and effective direction in order to sustain public morale.

The term "gas" in connection with warfare is very loosely used, as it includes any chemical substance whether solid, liquid, or true gas, employed for its harmful effects on the human body; for example, mustard gas is a liquid at ordinary temperatures, but continually gives off a vapor. Many of these substances are encountered in industrial exposures either as reagents or by-products of manufacturing processes.

According to their physiological effects, all war gases used at present may be classified into five groups: (1) vesicants, (2) lung irritants, (3) the lacrimators or "tear gases," (4) irritant smokes or "sneeze gases," and (5) systemic poisons.

The following descriptions and therapy for the various types of gas casualties were taken largely from publications of the United States War Department and the United States Office of Civilian Defense.

(1) VESICANTS

The most important gases of the vesicant type are mustard gas, lewisite, ethyldichlorarsine and the new nitrogen mustards. These agents, in either the liquid or vapor phase, have not only the ability to produce blistering and necrosis

of the skin, but have an irritative action on the eyes, repiratory system, and gastro-intestinal tract. Those containing arsenic may also cause general systemic poisoning following absorption into the circulation. Since it is the general opinion that in a region like the Middle West the most likely type of gas to be used is one of the vesicants, most probably mustard, these gases will be discussed in more detail. The vesicants also present more special problems due to their persistent action.

Mustard Gas (HS)

Mustard gas accounted for about 70 per cent of the gas casualties in the last war. The mortality from mustard gas in the British Army was 2 per cent. Eighty per cent of the cases were fit for active duty within a month. It can be used in shells and bombs, and can be sprayed from airplanes.

Mustard is an oily liquid, only slightly soluble in water, but soluble in organic solvents, (Gasoline, kerosene, acetone, carbon tetrachloride, and alcohol), and in animal fats and oils. It is slowly absorbed by rubber gloves and clothing and thus contaminates these articles. It has an odor like garlic or horseradish. It is a persistent gas, being effective in the summer from 4 to 5 days in the open and one week in the woods; in the winter, several weeks both in the open and in the woods.

The extent and severity of skin lesions are greatly influenced by weather conditions. Vesicle formation is more severe and extensive, and occurs more rapidly during hot, humid weather. The typical mustard blister is translucent, has sloping sides, and is surrounded by a zone of erythema. The vesicle collapses in about 50 hours. Severe lesions are followed by a progressive necrosis into the lower portion of the dermis. Sloughing occurs in about three weeks followed by slow healing, leaving a thin scar. Mustard burns are frequently followed by pigmentation which may persist for long periods.

There is marked irritation of the nasal passages, trachea, and bronchi, followed by edema, shedding of mucous membrane, and ulceration. This is frequently followed by secondary infection and broncho-pneumonia, which is responsible for the vast majority of deaths. Conjunctivitis is usually present and corneal ulceration, iritis, iridocyclitis, with exudation into the anterior chamber, may occur in severe cases.

Symptoms following exposure are delayed; the latent period depending upon the weather, concentration, and individual sensitivity. Eye symptoms are generally the first to appear. These may begin two or three hours after exposure to vapor, at first consisting of a sensation of grit in the eye and lacrimation, then proceeding to acute conjunctivitis. Skin burns from vapor may not appear for 12 or more hours, but may occur within one hour if contact is with liquid mustard. The first symptoms may be severe itching of the skin followed by the sunburn-like erythema, upon which blisters develop. Because of the depth of the skin destruction, mustard lesions heal slowly and tend to become infected. Areas of thin or moist skin, such as the perineum, external genitalia, axillae, elbows, knees, and neck are particularly susceptible.

Mustard burns of the eye, according to experience during the first World War, have been divided into three groups:

a. Mild conjunctival irritation which will respond to symptomatic treatment within one to two weeks (75 per cent of the cases).

b. Severe conjunctival injury showing a horizontal band of white chemosis between the lids with orange-skin roughening of the cornea. Recovery four to six weeks (15 per cent of the cases).

c. Corneal erosion. Detected by the use of 2 per cent fluorescein. Convalescence, two to three months.

Prophylaxis to be effective must be instituted within a few minutes. First, droplets of liquid mustard are dabbed off using pieces of cloth or blotting paper.

Contaminated clothing must be quickly removed and placed in metal containers until such time as it can be decontaminated by chlorine or by boiling.

Prophylactic treatment consists, first, of the use of protective ointments such as are being provided at present only to military personnel or, second, the skin may be dabbed with 20 per cent solution of dichloramine-T in triacetin. Third, solvents such as gasoline, kerosene, and carbon tetrachloride may be used. Care should be taken so that the solvent does not run from the contaminated area to the unaffected skin. Fourth, products containing active chlorine, such as Dakin's solution, or a paste of ordinary bleach may be applied over the affected area. Following the use of dichloramine-T, solvents, or products containing chlorine, the skin should be washed with soap and water and patted dry. This must be done in the case of bleach paste within three minutes because of its irritant action.

Protective ointments or chlorinating agents should not be used after erythema of the skin has appeared since they will increase the irritation.

The attending physician must remember that rubber gloves are a potential source of injury to the wearer. If rubber gloves are worn they must be decontaminated frequently in dilute sodium hydroxide solution and changed often. If bare handed, the physician should immerse his hands in dilute bleach solution for a few minutes and then wash them thoroughly. Contaminated instruments should be boiled for one-half hour in a dilute sodium bicarbonate solution.

If the mustard has entered the buccal or nasopharyngeal cavities, the mouth should be rinsed and the throat gargled repeatedly with a 2 per cent sodium bicarbonate solution or with water.

Treatment of the eyes, if affected, should always be given preference over treatment of the skin. Seventy-five to 90 per cent of all mustard gas casualties have ocular involvement. Treatment should consist first of immediate irrigation of at least two minutes with 2 per cent sodium bicarbonate solution, 9/10 per cent saline, 2 per cent boric acid, or water. Pontocain, ½ per cent, or butyn 2 per cent, should be applied only if necessary for examination or performing treatment. The use of cocaine or bandages over the eyes is contraindicated.

The War Department recommends the installation of sodium sulamyd (1 gram per 30 cc.) in each eye every two hours, for 48 hours and four times daily until the acute symptoms have subsided. There has been some experimental use of a sulfonamide ointment (5 per cent in white petrolatum) or "microcrystalline," sulfadiazine powder locally in the eye every four hours. Sulfadiazine orally has been recommended for corneal ulceration. Argyrol, 10 per cent, followed by boric acid irrigations may be used if sulfonamides are not used locally. Liquid petrolatum or cod liver oil made alkaline with sodium bicarbonate may be instilled to prevent the eyelids from sticking.

Fully developed skin burns are treated like burns of equal degree from other causes. Mustard burns are prone to secondary infection. Special attention must be given to asepsis.

Lewisite (M-1)

Lewisite was developed by Professor Lee Lewis of Chicago in 1917, but was never used in the World War. It is a liquid, poorly soluble in water but readily soluble in organic solvents. It has an odor of geraniums. It differs from mustard gas in that it develops a more rapid and intense inflammatory condition of the skin, and the irritation of the eyes is almost immediate. The lewisite blister is more opaque than the mustard blister, has steep sides and is surrounded by little or no erythema. Inhalation produces ulceration of the upper respiratory tract and secondary bronchopneumonia may follow. Lewisite contains arsenic and when present in large quantities on the skin can be absorbed and cause severe arsenic

poisoning manifested by dryness and soreness of the throat, diarrhea, and restlessness. Later, other structures such as the liver and nervous system may show involvement.

Prophylaxis to be effective against skin contamination from liquid lewisite should be instituted within one minute after exposure since skin penetration is rapid. The prophylactic treatment of lewisite is similar to that for mustard, although the specific remedies differ. First, lewisite drops are removed by quickly blotting with dry absorbent material, and contaminated clothing must be removed quickly with the usual precautions. Neutralization and removal can be effected by the use of 8 per cent hydrogen peroxide. (If not available, use U.S.P. 3 per cent). A 10 per cent solution of sodium hydroxide in 30 per cent glycerin may be used if hydrogen peroxide is not available. The skin should be swabbed alternately with this solution and alcohol. If the glycerin solution is not available, a 5 per cent aqueous solution of sodium hydroxide may be used and water may be used as a less effective substitute for the alcohol. If none of the foregoing materials are available, the same solvents and technique described for mustard may be used.

Lewisite vapor causes marked injury to the eye, but because the irritant vapor compels wearing of a gas mask, few eye casualties from vapor are anticipated. Liquid drops, however, can destroy an eye unless properly treated. A special eye solution is being prepared which so far is apparently being made available to the armed forces. This solution is of no value for mustard contamination, but should be used for decontamination by mixtures of lewisite and mustard, and for al. other arsenical vesicants. Otherwise the treatment of eye injuries is the same as for injuries resulting from mustard.

It is usually recommended that the content of the blisters be evacuated promptly to prevent the absorption of the arsenic in the blister fluid. Recently, there has been some dispute as to whether blisters contain significant amounts of arsenic. General measures to combat arsenic poisoning should be instituted in cases with extensive burns. These include adequate fluid intake, intravenous glucose, high carbohydrate diet, and vitamin intake.

Ethyldichlorarsine (ED)

Ethyldichlorarsine is less persistent than lewisite or mustard, lasting from one hour in the open in the summer to twelve hours in the woods in the winter. It is more irritating to the nose, nasal pharynx, and lungs than lewisite or mustard. Immediate symptoms of sneezing, and often vomiting, are therefore common. It is less irritating to the skin and therefore less likely to blister. It is capable, however, of causing arsenic poisoning. The prophylaxis and treatment in general is the same as that described above for lewisite.

Nitrogen Mustards

The nitrogen mustards are a series of new vesicant war gases which may be encountered in the event of gas warfare. They are not easily detected in the field by odor since they are nearly odorless or lack characteristic odors. The action of these gases is similar to that of mustard gas, with the exception that the vesicant action is less severe and the effect upon the eyes is greater. In addition, they destroy the leucocytes of the blood and act as necrotizing agents to the lymphatic tissue, the hemopoietic system, and certain areas of the central nervous system. Mild exposures, however, will probably not cause noticeable systemic symptoms. Most of the knowledge of the effects of these new materials depends upon animal experimentation. Prophylaxis and treatment is essentially the same as that for mustard.

2. LUNG IRRITANTS

These include chlorpicrin, phosgene, diphosgene and chlorine. It has been suggested that probably only phosgene will be used in the future.

Phosgene (CG)

Phosgene is a colorless gas with an odor suggestive of green corn or musty hay. Since field concentrations of phosgene may be breathed without immediate irritation of the upper respiratory tract, the whole respiratory system is exposed. The effects are predominantly in the alveoli and bronchioles. Alveolar walls and capillaries are rendered more permeable and the alveoli fill with fluid. Capillary thrombosis and hemorrhages may occur. Hemoconcentration results from pulmonary edema. The skin is unaffected but the eyes may show a mild conjunctival irritation. Pulmonary edema, right-sided heart failure, and general circulatory collapse are the general causes of death.

There may be no respiratory symptoms until pulmonary edema develops suddenly. This latent period may last 6 to 24 hours. Sometimes there is a gradual development of symptoms, with redness of the eyes, flushing of the face, increased respiration, and occasionally painful cough. Transient nausea and vomiting may occur. In the more severe cases, the patient may develop a deep cyanosis with engorgement of the neck veins (the "blue" type of asphyxia). During this stage, the patient may suddenly or gradually develop cardiac failure manifested by the grayish-leaden hue of the skin, collapse of the neck veins, and cold, clammy skin (the "gray" type of asphyxia). He may die during the gray period or some days afterward with a secondary bronchopneumonia.

Treatment must be started as soon as any symptoms of phosgene poisoning appear. These consist of absolute rest, application of heat, inhalation of oxygen by means of an oxygen mask or nasal catheter. Atropine is of no value in diminishing or preventing edema. Blood plasma is of no value in therapy of this type of edema and concentrated plasma is definitely harmful. The sulfonamide drugs should not be administered during the first 24 hours after gas inhalation; a temperature rise after 24 hours justifies their use. Cardiac and respiratory stimulants do more harm than good in the stage of pulmonary edema. Venesection is indicated in the "blue" cases. Morphine should never be given. Restlessness and apprehensiveness may be combatted with guarded doses of the barbiturates but the relief offered by oxygen inhalation is the best means of quieting and reassuring the patient.

Chlorpicrin (PS)

Chlorpicrin is a colorless liquid which evaporates with an odor suggestive of fly paper or anise. Its effects upon the lungs are similar to those of phosgene. In addition, it is a strong lacrimator and is more irritating to upper respiratory tract. Pain in the chest, paroxysmal attacks of coughing and violent attacks of vomiting are more marked than with phosgene. The treatment is essentially the same as that for phosgene poisoning.

LACRIMATORS (TEAR GASES)

Of the lacrimators, chloracetophenone and brombenzylcyanide are the most important. These chemicals do not produce casualties requiring hospitalization. They cause immediate irritation of the conjunctival surfaces of the eyes, but symptoms usually pass off in an hour in a gas-free atmosphere. Higher concentration may cause irritation of the upper respiratory tract with burning of the throat, coughing, tightness in the chest, and possibly nausea and vomiting. These agents also may act to some degree as skin irritants. Treatment consists of removing the victim from the contaminated atmosphere, and allowing the wind to blow into the eyes. Boric acid or saline irrigations may be used. Clothing should be loosened and shaken to get rid of the gas. Persons suffering from severe irritation of the skin should bathe with soap and water, or apply 4 per cent sodium sulfite in 50 per cent alcohol.

IRRITANT SMOKES (Sternutators or Sneeze Gases)

Irritant smokes are designed to harass the enemy and produce lack of con-

fidence in gas masks. Their persistency is about 10 minutes. The two most important are diphenylaminechlorarsine (Adamsite) and diphenylchlorarsine. Adamsite is a yellow smoke with an odor similar to coal smoke. Diphenylchlorarsine is a colorless white smoke. These gases cause violent coughing, sneezing, vomiting, headache, tightness and pain in the chest, and mental depression. Because the symptoms may be slightly delayed, they may not appear until after the gas mask has been put on. The uninformed, believing his mask is inefficient, may then remove it and become a casualty from further exposure to this agent or others accompanying it. Nasal irritation may be relieved by breathing a low concentration of chlorine gas such as is evolved from a bottle of high test bleach powder. Sedatives may be used when necessary. These gases are rarely fatal and incapacitate for 12 hours or longer.

SYSTEMIC POISONS

Of the systemic poisons, hydrocyanic acid and carbon monoxide are the most common. These are not practical for use in warfare since it is difficult to establish effective concentrations under field conditions. Carbon monoxide may be encountered in dangerous concentrations in compartments in which bombs or shells have exploded. The service gas mask does not protect against this gas. Symptoms of anoxemia such as ringing in the ears, blurred vision, confusion, and general weakness and collapse develop rapidly. Treatment consists of artificial respiration plus the administration of a mixture of carbon dioxide and oxygen by the inhalator method. The patient should be kept warm and at rest.

GENERAL PROTECTIVE MEASURES

It is obvious that to protect the civilian population against such a method of warfare, careful education, organization, and discipline are necessary. The U. S. Office of Civilian Defense is organizing a nationwide program of gas defense. In each state there is to be appointed a state gas consultant who shall provide technical advice to the state defense council in all matters relating to the protection of civilians against war gases. He is also to assist in the organization of the state gas defense program and to provide advice to local gas officers. Each local commander of the Citizens' Defense Corps is to appoint a senior gas officer to develop and organize a gas defense program for the local community. Under the senior gas officer there shall be appointed gas reconnaissance agents who are primarily responsible for the identification and delineation of contaminated areas. Other services such as the emergency medical service, health department service, air raid warden service, utilities, police and fire services, are being organized for their part in gas defense.

Under the passive defense against gas warfare, such items as gas shelters, protective clothing, gas masks, and decontamination must be considered, but they are largely beyond the scope of this paper.

The issuance of gas masks to civilians in this country is now under way in a limited scale. Gas masks and protective clothing for civilian protection services are now being distributed.

Cleansing of individuals is necessary only when the gas used is a persistent one such as mustard gas. According to official plans, persons who have been gassed with persistent gases but not otherwise injured are supposed to cleanse themselves. General instructions from Operations Letter No. 46, "How to Protect Yourself Against Gas," Office of Civilian Defense, are as follows:

"1. War gases stay close to the ground, for they are heavier than air. To get out of a gassed area, simply walk against the wind or go upstairs.

"2. Gas is irritating and annoying to the eyes, nose, lungs, or to the skin, but it is usually harmless if you do not become panicky but promptly leave the gas area and cleanse yourself. A soldier must put on a

mask where it is necessary to remain in the contaminated area, but a civilian can go up on the second or third floor and literally ignore it if the windows are kept closed.

"3. If the gas should get on your skin, you can prevent it from doing much harm by sponging it off as quickly as possible with a piece of clothing, such as a handkerchief, and applying some neutralizing substance, followed by a thorough bath, preferably a shower, with common laundry soap and water.

"4. If you are indoors, stay there with doors and windows closed, and go up to the second or third story. Stay out of basements. Turn off the air conditioning, and stop up fireplaces and any other large openings.

"5. Some gases are spread as oily droplets which blister and burn the skin and eyes. If you are outside when gas is used do not look up. Tear off a piece of clothing or use a handkerchief to blot any drops of liquid from your skin and throw the contaminated cloth away. Blot, do not rub, as rubbing will spread the liquid. Then go home, if it is nearby, or to the nearest place where you can wash immediately with soap and water and cleanse yourself in the following manner:

a. Remove all outer clothing outside the house, since gas can be transmitted to others from contaminated clothing. Put it preferably in a covered garbage pail.

b. Apply one of the following effective household remedies to the part of your skin that has been contaminated; Chlorox or similar household bleach (for mustard); peroxide of hydrogen (for Lewisite); paste or solution of baking soda if you have no peroxide or bleach. If you do not know the gas, use both peroxide and bleach. Keep bleach and peroxide out of the eyes. Do not waste time looking for these remedies; bathe immediately if they are not at hand.

c. After entering the house, wash the bleach or peroxide from the hands with laundry soap and water and then wash the face. Remove the underclothing, place it in a covered garbage pail, and enter the bathroom.

d. Irrigate the eyes with large amounts of lukewarm 2 per cent solution of baking soda (one tablespoonful to a quart of water), or else with plain water. Use an ordinary irrigating douche bag or an eye irrigator. If you do not have these, let plain warm water pour into the eyes from the shower, washing them thoroughly. Do not press or rub the eyes.

e. Lastly, take a shower, using laundry soap and hot water.

f. If the nose and throat feel irritated, wash them out also with baking soda solution.

g. If your chest feels heavy and oppressed, if you have any trouble breathing, or if cigarette smoke becomes distasteful, lie down and stay perfectly still until a doctor sees you.

h. If blisters develop, be careful not to break them and call a doctor.

"Remember:

Soldiers require gas masks because they must remain in the contaminated area. Civilians can get out of the gassed area or get above the level of the gas, where they do not need gas masks or protective clothing.

"Injured persons, who are gassed, require decontamination before they can be admitted to hospitals. All other civilians can best prevent any serious injury by promptly helping themselves in the manner outlined, using a kitchen or bathroom, laundry soap and water, and a few

materials found in every household."

Cleansing stations should be provided for injured civilians requiring hospitalization or unable to care for themselves, for workers in industrial plants, and for decontamination squads or other civilian protection personnel. Cleansing stations should be located in each hospital of 150 beds or more, or at least in the ratio of one per every 50,000 civilians. Improvised stations may be located in shower and dressing rooms, garages, gymnasiums and suitable gasoline stations. At the cleansing station, the patient's clothing will be removed, his skin freed of gas and will be marked to identify the toxic agent. He is then ready for transfer to the casualty station. Facilities will be available for the disposal of contaminated clothing and protective equipment will be provided for personnel in these stations.

The above is an outline of the official plan, but it must be remembered that in the excitement of an air raid, every practicing physician should be capable of administering first aid.

In spite of the numerous difficulties which are suggested, it is generally conceded that with trained personnel and proper organization, a civilian may be more effectively protected against gas warfare than against high explosives or incendiary bombs.

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V. GOSSIP

One of the hopeful signs of our times is the almost complete disappearance of kicking about food service in the interns' dining room. Most of us realize the necessity of food restrictions and menu changes. One hears few complaints about gas restrictions, and most of us have only "A" cards. One hears little crabbing about other changes in our way of life. The only thing which remains is the apparent unwillingness of certain staff members to recognize the limitations of their associates. The following extract from an article by Clare Dennison, R.N., Director, School of Nursing, and Superintendent of Nurses, Strong Memorial Hospital, The University of Rochester, Rochester, N. Y., is of interest.

"Nursing service in our hospitals includes much which is not nursing care. Here we could list such activities as keeping and sending to the cashier the charges for medical, dietetic, laboratory, and hospital services not routinely given to all patients; keeping hospital statistics; maintaining an economical use of large quantities of supplies, some of which are not used by nurses; serving meals to patients' visitors; managing the administrative details of the admission and discharge of patients; arranging for the transportation home of the discharged patient; relaying telephone messages to patients' visitors; keeping a critical public pleased with the hospital; preserving good relationships with at least a dozen other departments in the hospital not concerned with the bedside care of the patient but necessary to that care; and filling in the gaps whenever any one of those departments falls short of an adequate performance.

How simple is the care which goes on day and night in the hospitals? Let us look at the record. During the latter part of 1940 and the first of 1941 our nursing office did a spot study on the treatments and procedures which could not be given to subsidiary workers. We did this three times at two-month intervals for twenty-four hours, and while we know the findings are not conclusive, since so many head nurses, assistant head nurses, and night nurses collected the data, they are rather interesting. Outside of the operating room, the labor and delivery rooms, the out-patient department, and the emergency department, and excluding all diagnostic and research tests, we found about one hundred items covering periods of time ranging from approximately two minutes as in taking the apex pulse to twenty-four hours of constant attendance as in watching patients in respirators. From an average of 473 patients, 109 were ordered blood pressures in intervals of every fifteen minutes to once a day. Sixty patients, or one patient in every eight, received parenteral fluids or transfusions, and while these were not done by nurses, they required the help of a nurse and on two of these days patients were receiving continuous intravenous fluid and required constant attendance. The nurses gave gavages, placed fifth leads for electrocardiograms, and applied suction to surgical wounds, tracheotomies, chest cavities and throats.

They managed the apparatus for Wangensteen suction, tidal irrigation, and bladder decompression. They irrigated eyes, cecostomies, colostomies, draining wounds, urethral and ureteral catheters, They gave colonic irrigations. They did artificial respiration in interval needed to obtain a respirator, and started the operation of respirator. They applied sterile compresses and painted lesions. They did approximately 230 dressings in a day, and this does not include the times these dressings were taken down to show the wound to a surgeon. They did catheterizations, sitz baths, and turpentine stupes. They used the Danzer apparatus. They gave insulin and taught the patient or his relatives to give the drug and examine urine. They administered approximately 1,500 medications daily, by mouth or hypodermic. They had an average of seven patients a day under oxygen therapy and specialled patients after craniotomies, tracheotomies, and the usual surgery. They assisted with lumbar punctures, thoracenteses, paracenteses, and phlebotomies.

While all this went on, they met the usual expectations of the staffs. They knew, night or day, without direction, what to watch for and report for the thyroidectomies, the breast amputations, and the prostatectomies. In general it was not necessary for the surgeon to give specific directions nor to see his patient

for several hours after the operation. It was not necessary to tell the head nurse to watch for any toxic symptoms, even after chemotherapy; it was taken for granted that all this would be done. It was understood that the nurses would know how to administer any drug--and pick up any error in writing the order. They would not be exonerated from responsibility if by error 4 cubic centimeters of belladonna were written instead of .4 cubic centimeter, and any nurse followed the written order. The nurses would have been condemned if a patient scheduled for a cataract went to the operating room with even slight symptoms of a cold--or if any patient went there with a premonition that he was going to die. It was not a simple matter to decide on the evidence of symptoms shown whether or not to call the doctor at 2:00 a.m. or to calculate to a nicety the time the doctor should be called in order to appear in the delivery room at the proper moment, but the right decision was usually made. It would have been very inconvenient for all concerned during those days if the nurses had not known a good deal about the apparatus used in orthopedics, the machinery of the respirators, the oxygen tents, and the suction machines, but the fact that they did know was probably never noticed, so long have nurses been considered an extension of all the services in the hospital. In addition to this, each nurse accepted the responsibility for all services rendered her patient by any subsidiary worker, and every minute of every twenty-four hours the nurses were responsible for the prompt observation and reporting of any change in the condition of any patient.

We call these activities nursing care and their differentiation from nursing service is fairly clear. But when we consider the diagnostic tests now used we cannot so easily mark the difference. When patients are ill, we would say that these procedures constitute nursing care, but many of the patients who come to the hospitals to take these tests are not ill. We need to do more studies before making positive statements, but a careful survey of the medical records of fifty-four such patients show that during stays ranging from one to seven days, little or no nursing care was required. These patients had x-rays, basal metabolisms, phenolsulfonphthalein tests, gastric analyses, cystoscopies, gastrointestinal series and various blood tests and, so far as nursing care was concerned, these procedures could have been done by any intelligent and well-instructed person.

I do not imply that these routines are easily managed, although the uninitiated might conclude from reading the nursing technics manual that anyone who could read and tell time could follow the directions. The catch lies in the perversity of human physiology and behavior which often refuse to react as scheduled. Mr. Black rejects gall bladder dye. Mrs. White cannot tolerate the sugar given in the glucose tolerance test, while Mrs. Green accepts everything graciously, but cannot believe that "one little drink of water" will completely ruin a test. The nurse adapts the tests to these individual idiosyncrasies and does it successfully because she is intelligent and knows the purpose and the action of the tests. This equipment will not suffice her, however, if she has not also been able to make the patient understand and follow directions, and any who believe this to be a simple task should try to make these explanations to a few assorted patients.

I submit that all this does not add up to simplicity; and I contend that the head nurse who can allocate this work to the different abilities of staff nurses, student nurses, clerks, ward helpers, orderlies, and volunteers and on the whole reach a high degree of success in her planning is a very efficient person.

Administrators, doctors, and nursing service directors must decide how much of this service now given is so essential that it must be given during this crisis, who shall give it, and what adjustments can be made to give it under conditions which are economical of time and staff. It seems evident from current literature that there are individuals who have yet to be convinced that we face a problem. The lack of contact with reality found in the writer who feels it would be helpful if we made a daily shift of staff from oversupplied to undersupplied wards is as remarkable as his apparent belief that such a plan would be a new idea ..... etc..