

The Prevention of TETANUS

The Advantages of Immunization with Tetanus Toxoid

All persons in hazardous occupations, including those in the military services, or those civilians who may be exposed to serious injuries, should be actively immunized with tetanus toxoid. Other groups who frequently come in contact with soil, animal excretions and the like, or are exposed to industrial or highway-accident risks may appropriately be vaccinated. Rogers²⁶ has recommended that the following should receive prophylactic immunization with tetanus toxoid:

- (1) Horse-serum allergic individuals.
- (2) Asthmatic individuals.
- (3) Allergic individuals in occupations exposed to tetanus contamination.
- (4) Children and those in hazardous occupations (the latter classification is regarded as "justifiable").

The Consequences of Tetanus

Tetanus in the United States is fortunately rare. When the disease strikes, however, it is exceptionally fatal. A recent statistical study,¹ of about one-tenth of the United States population over a period of 5 years, indicated the overall mortality to be in the neighborhood of 40%, although undoubtedly

many series have been reported in which the mortality is considerably lower. If the patient does not lose his life, recovery is usually complete.

Administration and Dosage

Three forms of the tetanus toxoid are available for active immunization. If FLUID TETANUS TOXOID *Lederle* is used, 3 doses of 1 cc. each are given intramuscularly at intervals of 3 weeks. REFINED TETANUS TOXOID (Alum Precipitated) *Lederle* is administered in 2 doses of 1 cc. each, intramuscularly or subcutaneously at an interval of 2 months between injections. Intramuscular injection is preferable because local reactions are less marked. A maximum immune response occurs within 3 to 6 months. If simultaneous immunization against diphtheria and tetanus is desired, DIPHtheria-TETANUS TOXOID (Alum Precipitated) *Lederle* may be used in 2 doses of 1 cc. each, intramuscularly or subcutaneously, with an interval of 2 months between injections. Should exposure to either disease occur before completing immunization, the appropriate antitoxin for passive immunization should be administered.

Stimulating, or "Booster," Dose

When a previously immunized person is exposed, by accident or other-

wise, to possible tetanus infection, the immediate administration of another dose of tetanus toxoid appears to be indicated.²⁷ In the preventive treatment of wounded persons, tetanus toxoid is used only in cases where the patient has received a final immunizing injection of toxoid at least one month prior to receipt of the injury. Tetanus toxoid may be injected at the same time as the prophylactic dose of antitoxin, but in a different area. Tetanus toxoid should never be used for the treatment of tetanus.

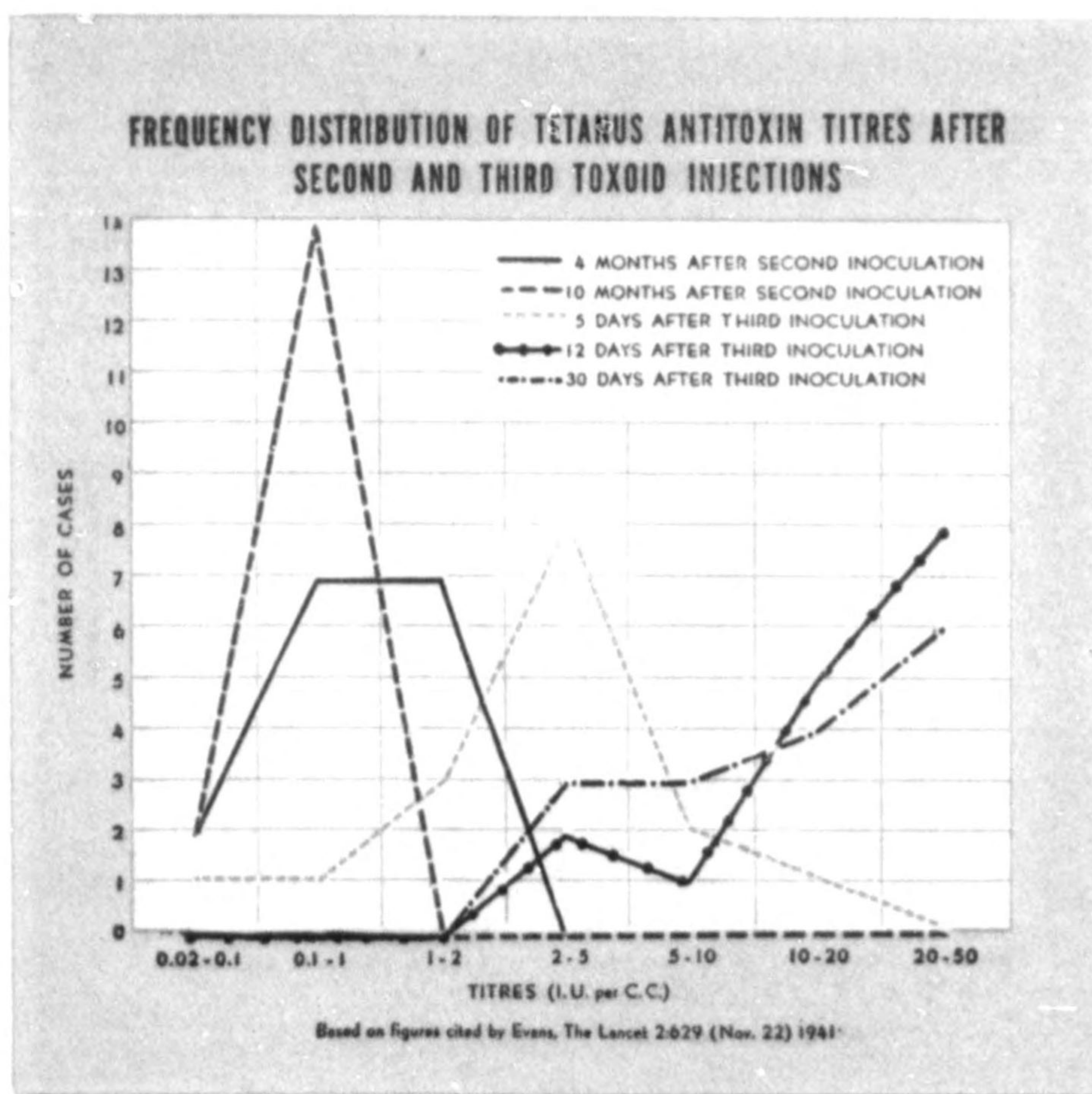
Reactions

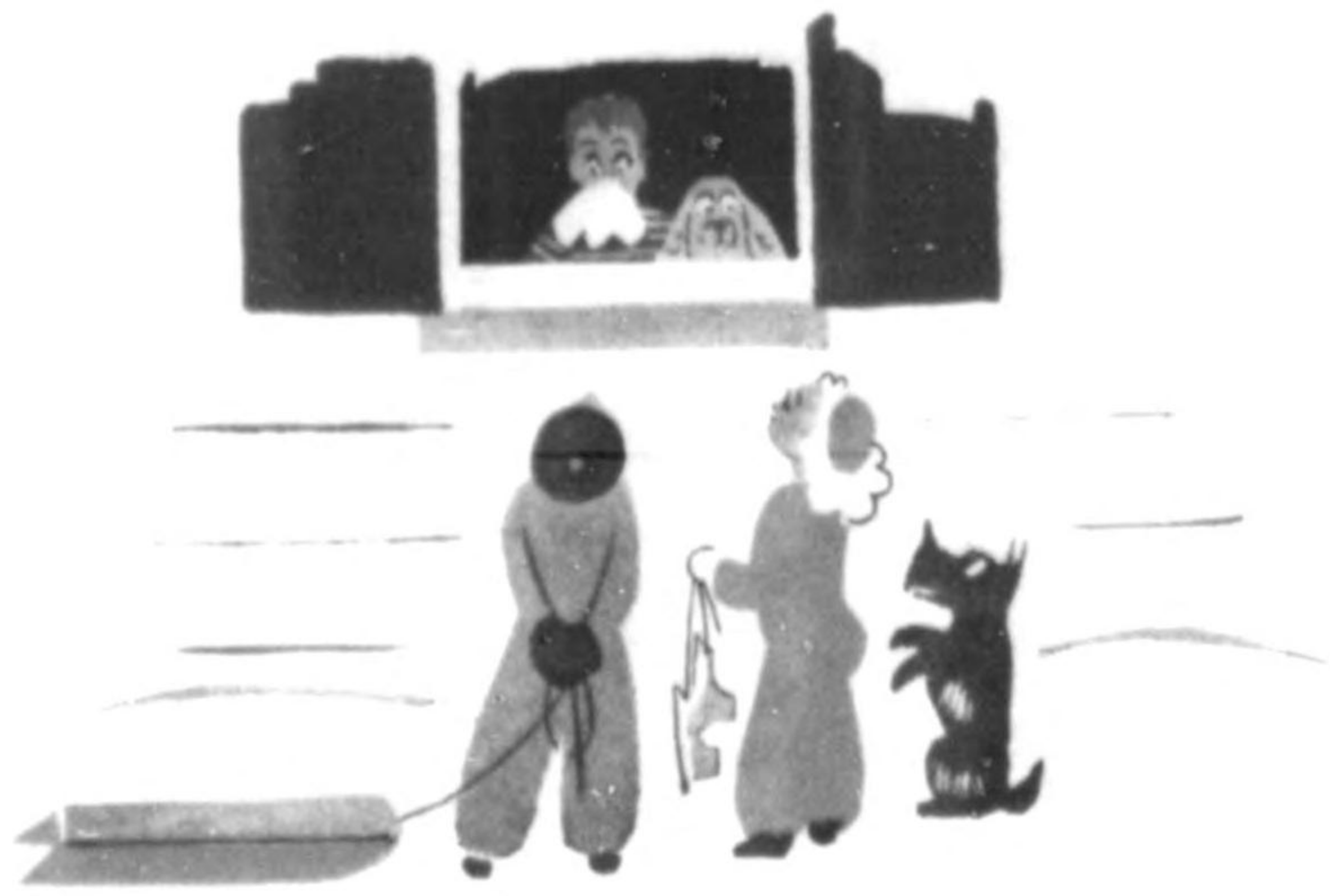
Local or systemic reactions have been reported, but on the whole have been mild.

Passive Immunization with Tetanus Antitoxin

Where immediate protection against tetanus is desired, the prophylactic use of TETANUS ANTITOXIN (Globulin Modified) *Lederle* is indicated. Severely lacerated or contused wounds, contaminated with foreign bodies (particularly soil) are likely to harbor tetanus organisms. For minor

cuts or abrasions and shallow puncture wounds, 1,500 units of tetanus antitoxin should probably be sufficient protection if injected within 24 hours following the injury. In extensive or slowly healing wounds, a second dose of 1,500 units should be given at the end of the week for prolongation of the immunity. In severe wounds, or in cases where prophylactic serum injection has been delayed, a passive immunizing dosage of 3,000 units is recommended, to be repeated a week or ten days later if healing is slow. Prophylactic antitoxin is generally administered subcutaneously so that absorption will be slow and immunity will persist for a maximum period thereafter (10-12 days). If prophylaxis has been delayed, however, the intramuscular route may be used for more rapid absorption. The usual precautions in the administration of serum should be taken. In addition to tetanus antitoxin, penicillin should be given in cases of grossly contaminated wounds. *Albergetti*²⁸ reports a fulminating case of tetanus with complete recovery 24 hours after the administration of antitoxin and penicillin.





Active Immunization against WHOOPING COUGH

The Advantages of Immunization with Pertussis Antigen Lederle

Prophylaxis Before Exposure

The consensus is that no natural immunity exists against an attack of whooping cough.²⁹

Joslin and Christensen³⁰ have reported immunization of a series of 982 children, of whom 183 became exposed, the exposed cases alone showing a protection rate of 81%. This suggests definite value for PERTUSSIS ANTIGEN (DETOXIFIED) Lederle in the group protection of children. The duration of immunity in these cases varied from 5 months to 2½ years. The authors further summarize their findings by saying "Children immunized with 6 cc. of antigen, who had definite exposure, showed a rate of protection of 94%."

The PERTUSSIS VACCINE PHASE I Lederle, made according to the method of Kendrick and Eldering, is now rec-

ommended by the American Academy of Pediatrics for active immunization.⁴ Garvin³¹ recommends that all babies should be routinely immunized against whooping cough. He states that a residential suburb of about 25,000 people was able through immunization to reduce its cases of preschool whooping cough to a yearly average of six, and in 1943 no cases occurred among immunized children.

Prophylaxis After Exposure

Joslin and Christensen³⁰ published their results on the immunization of children with PERTUSSIS ANTIGEN (DETOXIFIED) Lederle, following exposure to whooping cough, demonstrating a protection rate of 76% in 118 cases. Weichsel and Lapin³² administered the antigen in 57 directly exposed children. Complete protection was obtained in 37 (64.9%) of the cases; 11 (19.3%) had mild attacks of the disease, and 9 (15.8%) had attacks of average severity.

The Consequences of Whooping Cough

The direct mortality from whooping cough is not high, being reported in a recent statistical publication as in the neighborhood of 0.7%.¹ However, about 25% of infants under 6 months of age who contract whooping cough succumb.³³ Also, the sequelae are exceptionally severe. Cases of whooping cough are usually admitted to a hospital only for the treatment of complications. It is interesting to note that the incidence of bronchopneumonia associated with, or as a complication of pertussis averaged 47.6% (Herman Kiefer Hospital, Detroit³) for a ten-year period. Other complications that occurred with considerable frequency were: acute otitis media, 26.4%; albuminuria, 13.7%; myocardial insufficiency, 2.76%.

Therapeutic Use of Pertussis Antigen

Joslin and Christensen³⁰ have shown that in 1051 cases (as compared with 216 controls) of pertussis treated with this antigen, the duration of the disease was about one-half that in patients not receiving the antigen.

Active Immunization—Administration and Dosage

In using PERTUSSIS ANTIGEN (DETOXIFIED) *Lederle* for immunization of direct contacts and for curative use, from 1½ to 2 cc. per dose, given subcutaneously in 3 to 5 doses with an interval between doses of from 48 to 72 hours, should be employed. It is customary for general prophylactic use to employ 3 subcutaneous injections of 2 cc., at intervals of one week. Serious allergic reactions have not been reported.

PERTUSSIS VACCINE

PHASE I *Lederle* is given in the following dosages:

For the vaccine containing 10,000 million bacilli per cc.: 1.0 cc., 1.5 cc., 1.5 cc., and 1.5 cc.

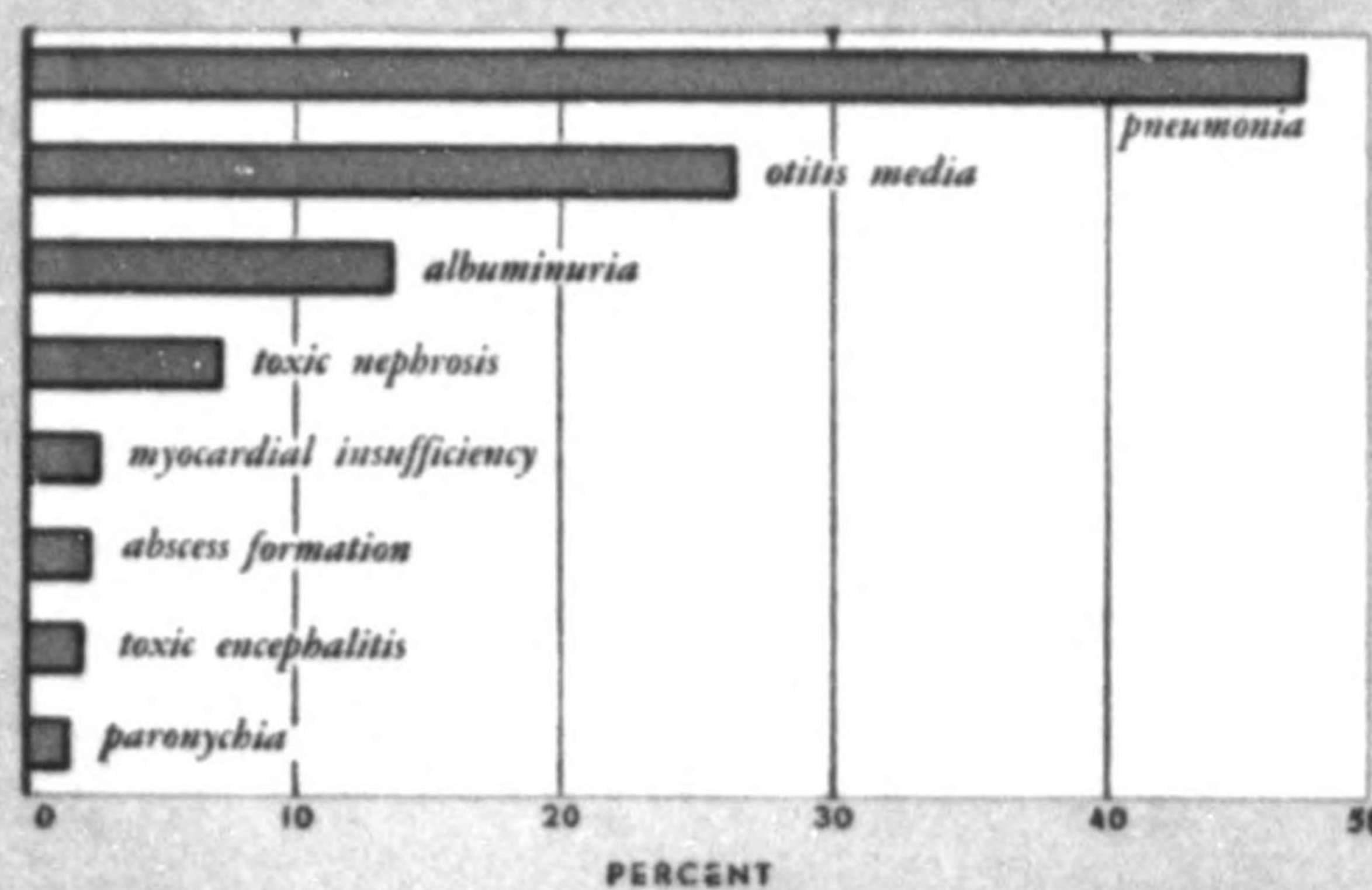
The doses are administered at intervals of about 1 month. The evidence now available suggests that the adequate spacing of injections is an important factor, as is the total dose given. However, weekly doses may be given.³⁴

For the vaccine containing 20,000 million bacilli per cc.: 1.0 cc., 2.0 cc., and 2.0 cc. The choice of intervals is the same as with the less concentrated vaccine, namely, an interval of about a month or, if preferred, weekly intervals.

For durable protection it is desirable to give an occasional stimulating dose. This is particularly important at the time when the child starts going to school. For this reinforcing injection a dose of 1 cc. may be used.

The Academy of Pediatrics⁴ recommends pertussis immunization at 6-9 months or at any subsequent time. It is questionable whether vaccination should be employed after 6 years of age.

DISTRIBUTION OF WHOOPING COUGH COMPLICATIONS
IN TERMS OF PERCENTAGE INCIDENCE IN HOSPITAL CASES



Based on figures contained in "Handbook of Communicable Diseases" by Franklin N. Top, M. D., Edition 1941



Active Immunization against
 secondary invaders that follow
COMMON COLDS *and other*
UPPER RESPIRATORY INFECTIONS

The Advantages of Providing Partial Active Immunity to Secondary Invaders of the Upper Respiratory Tract

Immunity to the mixed secondary invaders of the upper respiratory tract is brief in duration, and frequently provides that degree of protection against prolonged disability from colds which patients actively engaged in earning their living find so helpful. Accordingly, so-called "Catarrhalis" polyvalent vaccines are quite commonly used by physicians in northern climates.

The Consequences of Acute Upper Respiratory Infections

The time lost in recovering from colds and other acute upper respiratory infections is enormous. It has been calculated that this time amounts to a productive loss of 150,000 employee-years annually.

Administration and Dosage

CATARRHALIS COMBINED VACCINE *Lederle* is supplied in 1 dilution as follows (millions per cc.):

<i>Mic. catarrhalis</i>	200
<i>B. friedländeri</i>	200
<i>Streptococcus hemolyticus and viridans</i>	200
<i>Staphylococcus albus</i>	200
<i>Staphylococcus aureus</i>	200
Pneumococcus (Types I, II, and III)	200
	1200

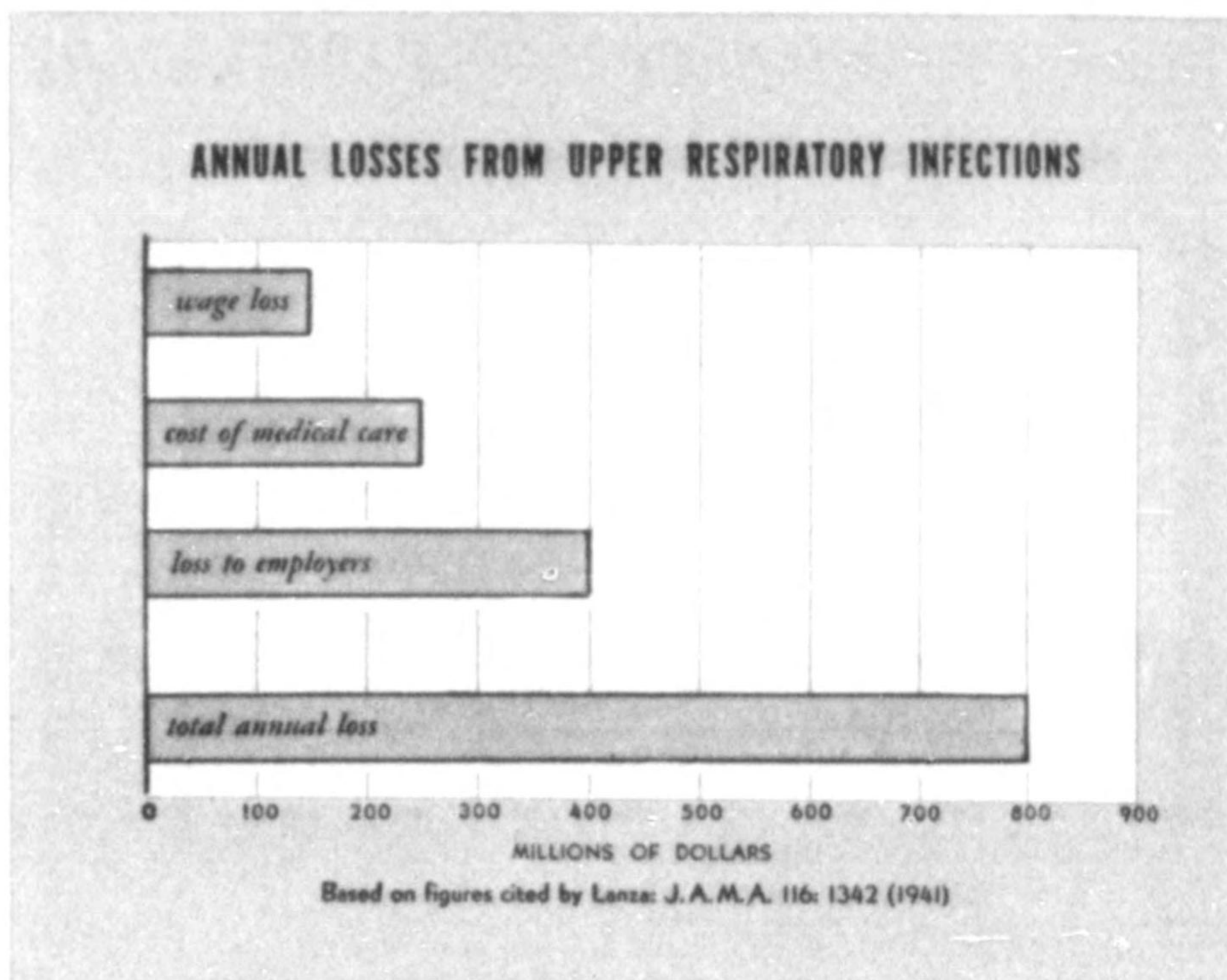
Physicians may prefer to use the CATARRHALIS INFLUENZA VACCINE *Lederle* as it contains the influenza organisms. It may be used in the same doses as the CATARRHALIS COMBINED VACCINE.

For prophylaxis, these doses may be injected at 3- to 5-day intervals.

The above dosage is given as a suggestion only. Physicians may prefer to start with much smaller doses, even

1/20 cc., in order more certainly to avoid reactions. The effect resulting from the same amount of vaccine administered in several small doses may be superior to that following the same amount administered in fewer doses. The maximum dose should usually not

exceed that amount which is well tolerated and the number of doses must be left to the judgment of the physician. The repetition of the highest tolerated dose once in 3 or 4 weeks throughout the winter season is suggested.





The Prevention of INFLUENZA

The Advantages of Immunization Against Influenza

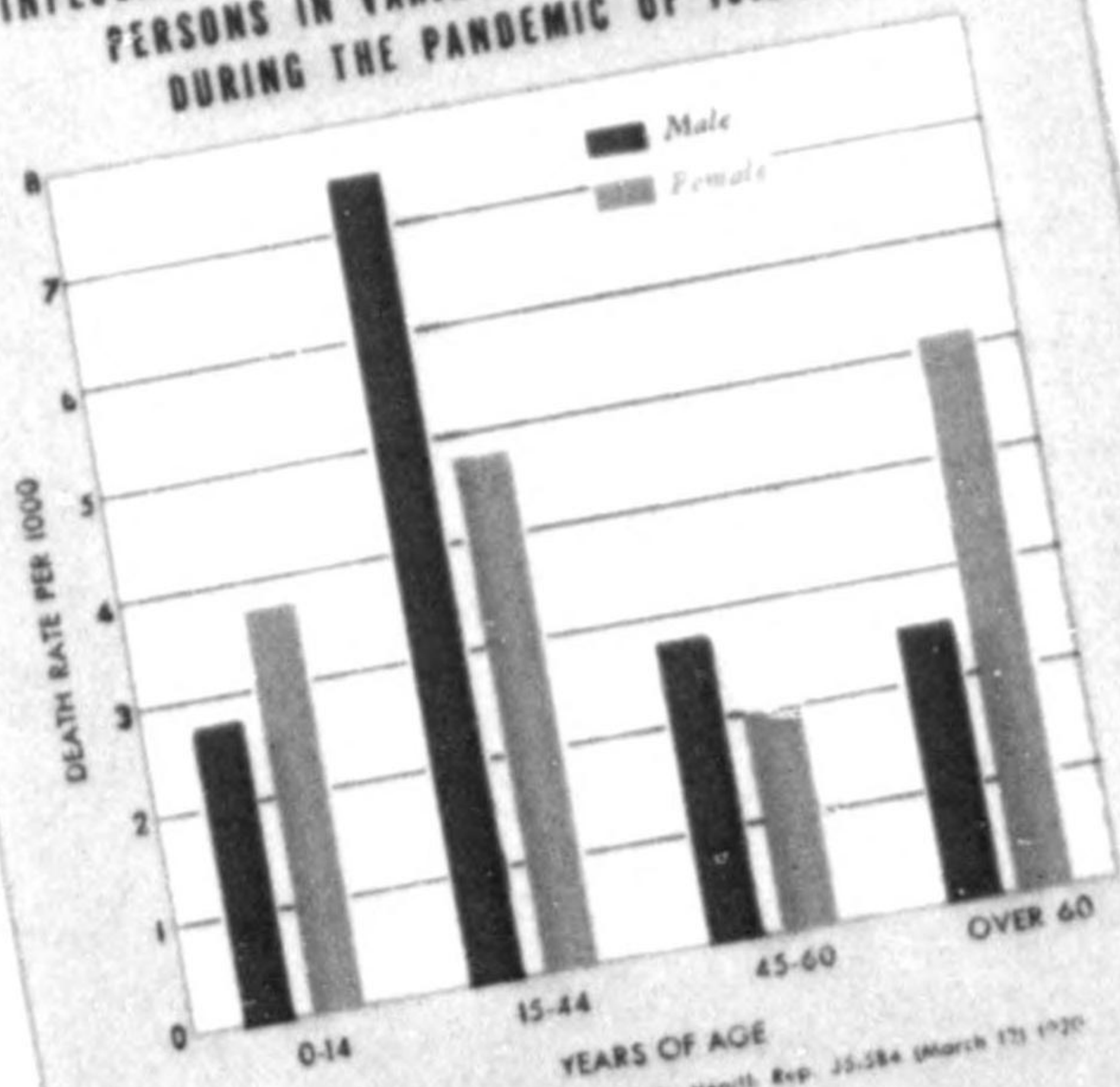
The duration of immunity provided by the INFLUENZA VIRUS VACCINE TYPES A AND B Lederle is not known at present. Studies on 102 male patients by Francis and co-workers^{35, 36} have shown that subcutaneous injections of combined influenza types A and B vaccine produced an increased resistance to the disease for from 1 to

4 months. Blake,³⁷ and Hirst and co-workers,³⁸ obtained results during the 1943-4 influenza epidemic which support the claim that protection can be obtained with the mixed vaccine from a clinical injection with either the Type A or Type B virus. The mixed vaccine is now used by the U. S. Army for routine influenza immunization.

The Consequences of Influenza

Although influenza in itself is not a fatal disease, it leaves its victims so debilitated that they contract intercurrent infections, usually pneumonia.³⁹ Influenza is a greatly feared complication of pregnancy.

INFLUENZA-PNEUMONIA DEATH RATE PER 1,000 PERSONS IN VARIOUS AMERICAN CITIES DURING THE PANDEMIC OF 1918-19



Administration and Dosage

INFLUENZA VIRUS VACCINE TYPES A AND B Lederle is prepared from the allantoic fluid of chick embryos injected with three strains of the influenza virus, Type A (known as the PR8 and Weiss strains) and Type B (known as the Lee strain). A single subcutaneous injection of 1 cc. is recommended for complete immunization, and should be given in the face of an epidemic.⁴⁰ The U. S. Army now uses 1 cc. subcutaneously as the initial dose and 1 cc. subcutaneously as a booster dose when exposure occurs.



Active Immunization against TYPHOID FEVER

Advantages of Immunization with Typhoid Combined Vaccine Lederle

Prophylaxis of Typhoid Fever

The prevention of typhoid fever by vaccine immunization is advisable in individuals who are, or are likely to be, members of groups working or living under conditions favorable to the dissemination of infectious disease. This includes military personnel, physicians, nurses, inmates of institutions, and other persons living under field conditions. Another class which may appropriately be maintained highly immune for public health reasons is that of food handlers, including dairy workers, food factory employees, and those in similar occupations. It is scarcely necessary to add that persons living, or expecting to live, in the tropics should be immunized.

Prophylaxis of Mixed Typhoid-Salmonella Infections

The use of vaccines combining typhoid and paratyphoid organisms in a single dose, for prevention of this group of infections, is widespread. The indications both for immunization and reimmunization are in general those described in the preceding paragraph, with the additional indication that in many areas in the

sub-tropics and tropics paratyphoid infections are endemic.

The Consequences of Typhoid Fever

The incidence of typhoid fever has steadily declined for many years in the United States. This decline is largely the result of improved sanitary and health measures coupled with prophylactic vaccination. A recent statistical study¹ reported, for a portion of northern United States population, a death rate (over a 5-year period) of almost 10%. The permanent sequelae of typhoid fever are, fortunately, relatively few. However, the long wasting course of the disease usually leaves the patient in very poor mental and physical condition for many months and may pave the way for a variety of serious consequences.

Active Immunization Against Typhoid Fever

Recent studies by Longfellow and Luippold⁴¹ and Siler and co-workers⁴² have indicated that immunity to typhoid fever may decline over a period of years in a significantly large proportion of immunized individuals, necessitating reimmunization. Individuals exhibit extreme variations in the duration of their immunity, one of the chief

causes of this variation being the virulence of the strain of bacteria employed in preparing the vaccine. If opportunity permits, the immune titer of the individual may be tested before reimmunization, since this may indicate that the latter is unnecessary. Injection of 1 cc. every spring, to maintain the immunity, is a common practice.

The use of vaccines combining typhoid and paratyphoid organisms for the prevention of these infections as a group is widespread. The indications for both immunization and reimmunization are in general the same for both groups. Paratyphoid infections are much more common, and more likely to be endemic, than typhoid fever, particularly in the tropics.

Active typhoid immunization is widely practiced in the armed forces of all civilized nations, with the result that typhoid fever as a military hazard has essentially disappeared.

Administration and Dosage

For immunization against typhoid-paratyphoid A and B, TYPHOID COMBINED VACCINE Lederle is employed:

1st Dose—0.5 cc.—500 million killed typhoid bacilli; 250 million killed paratyphoid "A" bacilli; and 250

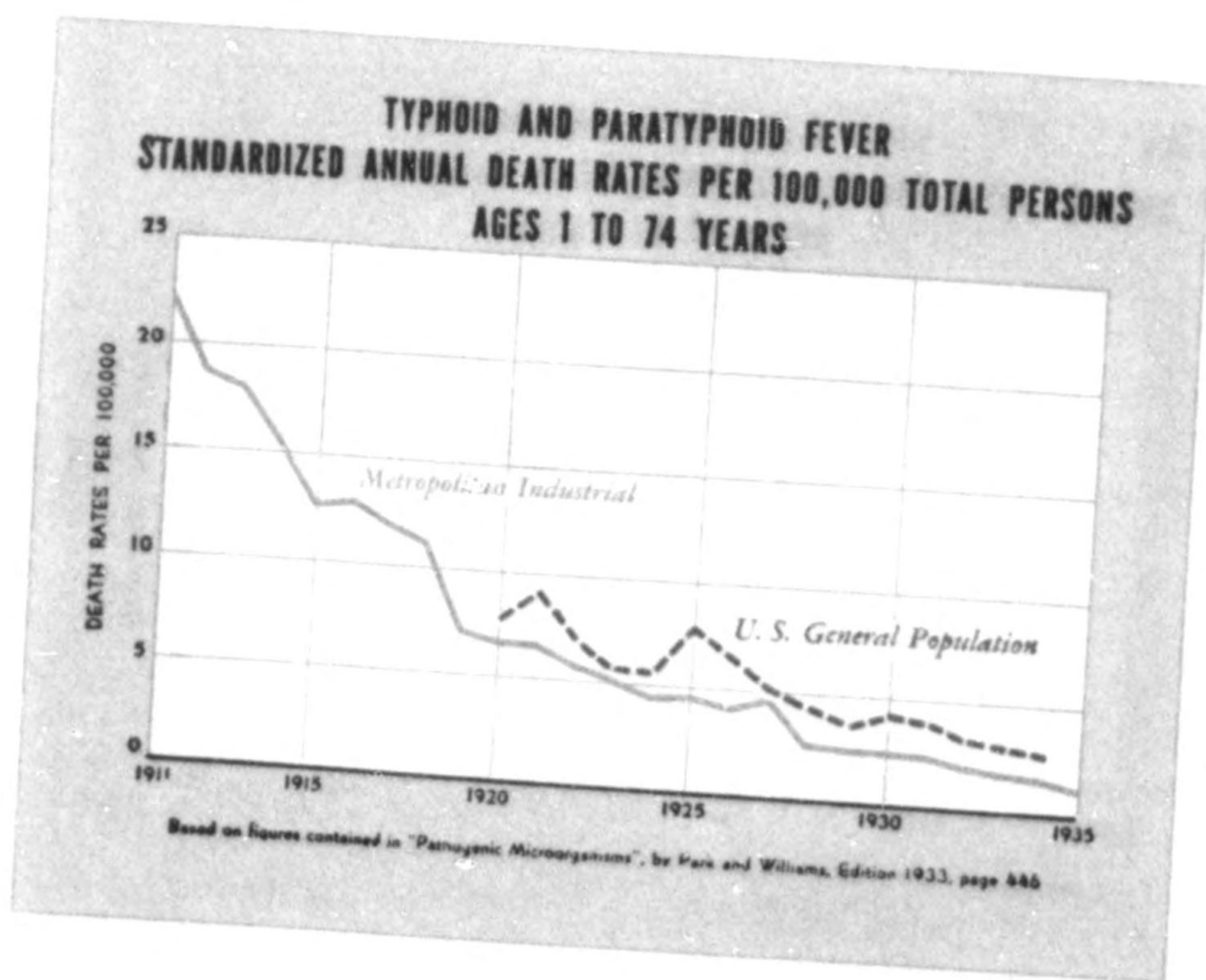
million killed paratyphoid "B" bacilli.

2nd Dose—1.0 cc.—1,000 million killed typhoid bacilli; 500 million killed paratyphoid "A" bacilli; and 500 million killed paratyphoid "B" bacilli.

3rd Dose—1.0 cc.—content identical with "2nd Dose" given above.

These doses should be given *subcutaneously* at 7-10 day intervals with the usual aseptic and other precautions. If necessary, however, the intervals may be reduced to 3-5 days. The dose used in the U. S. Army is 1 cc. subcutaneously annually or when exposure threatens. In case of reactions they give 0.5 cc. subcutaneously.

Persons exhibiting febrile signs, particularly an evening temperature, or persons known to be suffering from tuberculosis, should not be inoculated. Preferably, only healthy individuals should be given either of these vaccines. Women should not receive injections during the menstrual period. Subcutaneous antityphoid inoculation is usually well borne by children, the dose being proportional to the body weight, taking 150 lbs. as an adult average weight. *Prophylactic typhoid vaccines must never be used intravenously or for therapeutic purposes.*





The Control of TUBERCULOSIS

In the absence of specific therapy effective against the bacillus of tuberculosis, the eradication of this disease depends largely upon public health measures. These measures are directed toward the detection of the active disease at the earliest possible date, so that infected individuals may be treated and prevented from infecting others. General measures of hygiene, including improved nutrition, so that the disease will be less likely to appear in severe form, should be employed. The measures most useful for the early detection of tuberculosis are:

- (1) The tuberculin skin reactions, TUBERCULIN PATCH TEST (Vollmer) Lederle being easily applied.
- (2) The X-ray.
- (3) Careful physical and clinical examination.

Advantages of Tuberculin Patch Test (Vollmer)

The reliability of the Patch Test, as compared with the Mantoux Test, has been attested by the publications of many authors in the United States⁴³⁻⁵⁰,^{54, 56-64} and Canada,⁵² and Great Britain.^{51, 53, 55} The Patch Test is not intended to be used as a final test of tuberculin sensitivity. A small percentage of patients who fail to react to the Patch Test may still be tuberculin-sensitive. In such cases where infection is suspected, the patient should be retest-

ed with higher concentrations of tuberculin by the intracutaneous method. The other advantages of the Vollmer Tuberculin Patch Test may be summarized as follows:

- (1) It is painless and does not excite nervous children, thus maintaining confidence between the doctor and his young patient.
- (2) It avoids the use of instruments and their sterilization, with attendant inconvenience to the physician and fright to the child.
- (3) It eliminates trauma of the skin through injection, scarification, or rubbing.
- (4) The test is not time-consuming.
- (5) It may be applied by a nurse, acting under the direction of a physician.
- (6) Each Vollmer Tuberculin Patch Test is in fact a double test, since two squares of tuberculin-impregnated filter paper are employed.
- (7) Constitutional reactions are exceptionally rare in occurrence and mild in degree.
- (8) The material is stable for at least a year at ordinary conditions of temperature.

The Consequences of Tuberculous Infection

Statistics in the United States do not indicate satisfactorily the relationship between tuberculous deaths and the incidence of clinical infection. How-

ever, the Metropolitan Life Insurance Company⁶⁵ has estimated the following deaths, per hundred thousand, of policy holders of all ages as follows: 1939, 45.2; 1940, 44.6; 1941, 42.8; 1942, 41.7; 1943, 40.0. This slowly declining death rate is highly satisfactory, but so long as morbidity figures are not available, it does not fully indicate the need for protective measures.

Performance and Reading of the Patch Test

An area of skin over the sternum, along the upper portion of the back, or on the inner side of the forearm, is thoroughly cleansed with acetone, using a small pledget of fresh cotton for each patient. Hairy areas should be avoided. In the case of infants and young children, it may be preferable, in order to avoid accidental or deliberate premature removal of the adhesive tape, to place the patch on the upper portion of the back. The entire strip of adhesive, after removal of the crinoline, is carefully applied to the dry, cleansed area, under pressure with the warm palm of the hand.

THE PATCH IS LEFT UNDISTURBED FOR 48 HOURS, AND IS THEN REMOVED. THE TEST IS READ 48 HOURS AFTER THE REMOVAL OF THE PATCH, AS A RULE.

While many positive reactions may be read immediately after the removal of the tape, it is recommended that readings be made 48 hours afterward, when early reactions will not have disappeared, and some late reactions will have developed. Such reactions have been reported as late as the seventh day following removal of the patch, and many physicians are now reading all patch tests after two days and *also after seven days*.

If the physician does not plan to see the patient after the second day, he should advise the patient to inform him of any reactions occurring after the final reading. Such retarded reactions are not infrequent as late as the seventh day.

The removal of the tape during the 48-hour period of contact, even if

momentary, may result in fewer positive reactions. Bathing or wetting of the test areas should likewise be avoided during the 48-hour contact period.



Individuals differ through a wide range of sensitivity to tuberculin. This variability in sensitivity must be kept in mind by the physician in applying the Patch Test. The test essentially applies a form of tuberculin for the purpose of eliciting a tuberculin-sensitivity reaction in the skin. As such, it obviously may elicit a strong reaction

in individuals hypersensitive to tuberculin. The Patch Test is well adapted to limiting strong reactions, since any suspicion of hypersensitivity should cause the physician to apply the Patch Test for a short period. In order to avoid too strong a local reaction in cases suspected of having, or known to have, active tuberculosis, a preliminary Patch Test should be done. Tuberculous children with a high sensitivity to tuberculin (reacting to a Mantoux test, using old tuberculin, in a dilution of 1:1,000,000) usually show a positive reaction to the Patch Test when it is applied for only three hours. If this preliminary three-hour Patch Test is negative, a second test may then be applied for six hours; and if this is negative, then one for 12 hours; and finally, successively, one for 24 and 48 hours.

The appearance of an early reaction, as evidenced by severe itching at the site of application, should be regarded as a warning of a greater reaction to follow. Upon this symptom, the patch may be removed immediately and the area thoroughly washed, thus removing all tuberculin and arresting the progress of the reaction.

Reading the Reaction

A typical positive reaction appears as two sharply circumscribed, infiltrated, and reddened squares, with elevations and depressions covering all of the skin area with which the two test patches have been in contact. Positive reactions may be of all degrees, from vesiculation covering the whole area, down to a few or one single elevation. All of these should be considered as positive for screening purposes. Erythema without elevation or vesiculation should be read as negative. Brown staining from the patches may also occur but should not be the cause for confusion since the discoloration bears no resemblance to the tuberculin reaction. The control area will generally appear unchanged, but in a few cases may show a pale brown stain, which should be read as negative. Occasional individuals are sensitive to adhesive tape, but these reactions are readily distinguishable from positive or negative tuberculin readings by their distribution in the patch area.

Interpretation of Test

A positive tuberculin reaction means that the individual probably once had a tuberculous infection. This infection may have become arrested and remained inactive for many years. Patients with such partially healed and calcified areas react in about 80 per cent of cases to an ordinary first dose of tuberculin, but in about 20 per cent of cases they react only to high concentrations of tuberculin. In practice, these patients who react only to high concentrations of tuberculin usually harbor infections that are not of clinical importance. Of practical importance in mass examinations is the discovery

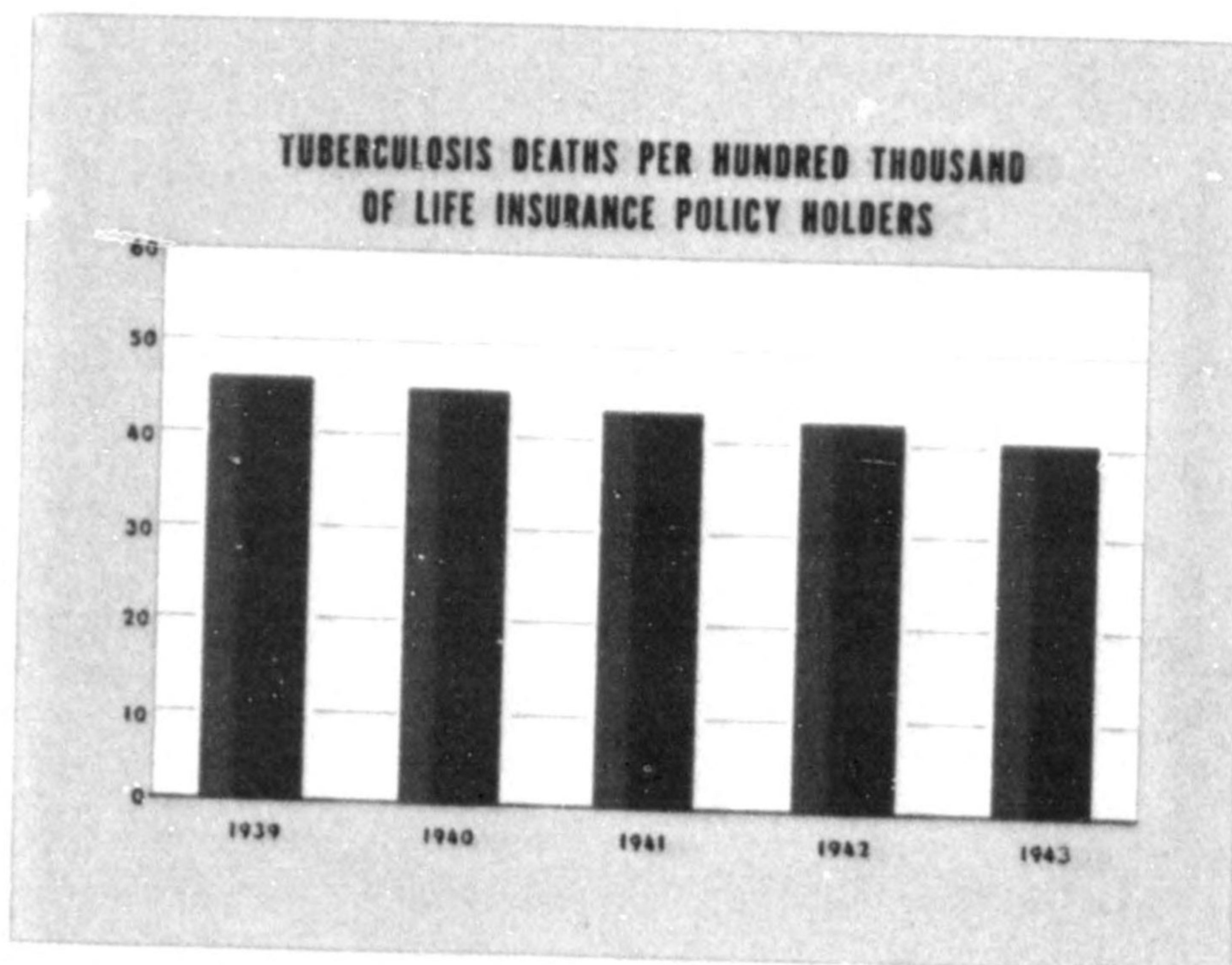
of incipient and active tuberculosis. Such processes, however, are characterized by a high tuberculin sensitivity and therefore are detected with the Vollmer Tuberculin Patch Test. A positive reaction from a Patch Test should be followed with an X-ray before a diagnosis of significant tuberculosis is made.

Reliability of the Test

The reliability of the Patch Test, as compared with the Mantoux test, has been attested by scores of publications. It is not intended as a final test of tuberculin sensitivity. A small percentage of patients who fail to react to it may still be tuberculin-sensitive. In such cases where infection is suspected, the patient should be retested with higher concentrations of tuberculin by the intracutaneous method.

Vollmer⁶⁶ has recently indicated that the Patch Test is less likely to cause pseudoreactions than the Mantoux test using more than 0.1 mg. of old tuberculin.

Children with X-ray evidence of pulmonary calcification should be tuberculin tested since it has been shown that other pulmonary conditions can produce calcification, viz. coccidiomycosis and histoplasmosis.⁶⁷ In these cases a negative Patch Test is very significant.



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Packages

Diphtheria

Diphtheria Antitoxin (Globulin Modified)
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First Aid

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First Aid



WHAT TO DO FIRST

1. **TAKE CHARGE**—A life may be lost for want of someone to take charge and give first aid when an accident has happened.
2. **FIND OUT HOW BADLY THE PATIENT IS HURT**—Look the injured person over carefully to see how badly he is hurt. Treat the more serious injuries first. Look for bleeding, wounds, broken bones, burns, signs of shock. If necessary, rip or cut the clothing from the injured part. Move the victim only if necessary and then with the greatest care; it is easy to make a bad matter worse by pushing a broken bone through the skin or by injuring the spinal cord in a broken back.
3. **ACT PROMPTLY BUT NOT HASTILY**—Decide what needs to be done and do it promptly. If there is bleeding, stop the flow of blood. Treat various injuries as suggested in this booklet. Keep calm and quiet. Do whatever is necessary to save the patient's life and to make him comfortable, but no more.
4. **SEND FOR A DOCTOR OR AMBULANCE**—Call a doctor at once. Tell him what has happened and what you have done.

TREATMENT OF WOUNDS

A wound is any injury to the skin or tissue, either within the body or on its surface. First-aid treatment of wounds consists of stopping bleeding and preventing germs from getting into the wound. Germs may be present on the skin, fingers, clothing, and unclean dressings.

External Bleeding

Severe bleeding must be checked as quickly as possible to prevent death. The blood may flow in quick spurts or in a steady

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stream. spurts of blood mean that an artery has been cut; a steady flow means that a vein has been cut. Bleeding from an artery can usually be stopped by pressing with the thumb at the spot where the artery crosses a bone. The main spots upon which to make pressure are shown in the picture on page 3 (Figure 2). When an artery is bleeding (quick spurts) the pressure spot is *between* the bleeding point and the heart. When the bleeding is from a vein (steady flow), pressure must be made on the side away from the heart. If the flow of blood is not violent, a compress placed over the wound may be sufficient.

How to Apply a Tourniquet

Only when these methods fail to check the hemorrhage should the use of a tourniquet be considered. So many serious results, including the necessity of amputating a limb, have followed the use of the tourniquet, that the tendency is to dispense with tourniquets altogether in first-aid work. A description of their use is given here for the information of those in isolated communities where a doctor cannot readily be reached and in case of a serious injury with severe bleeding which cannot be checked by the pressure

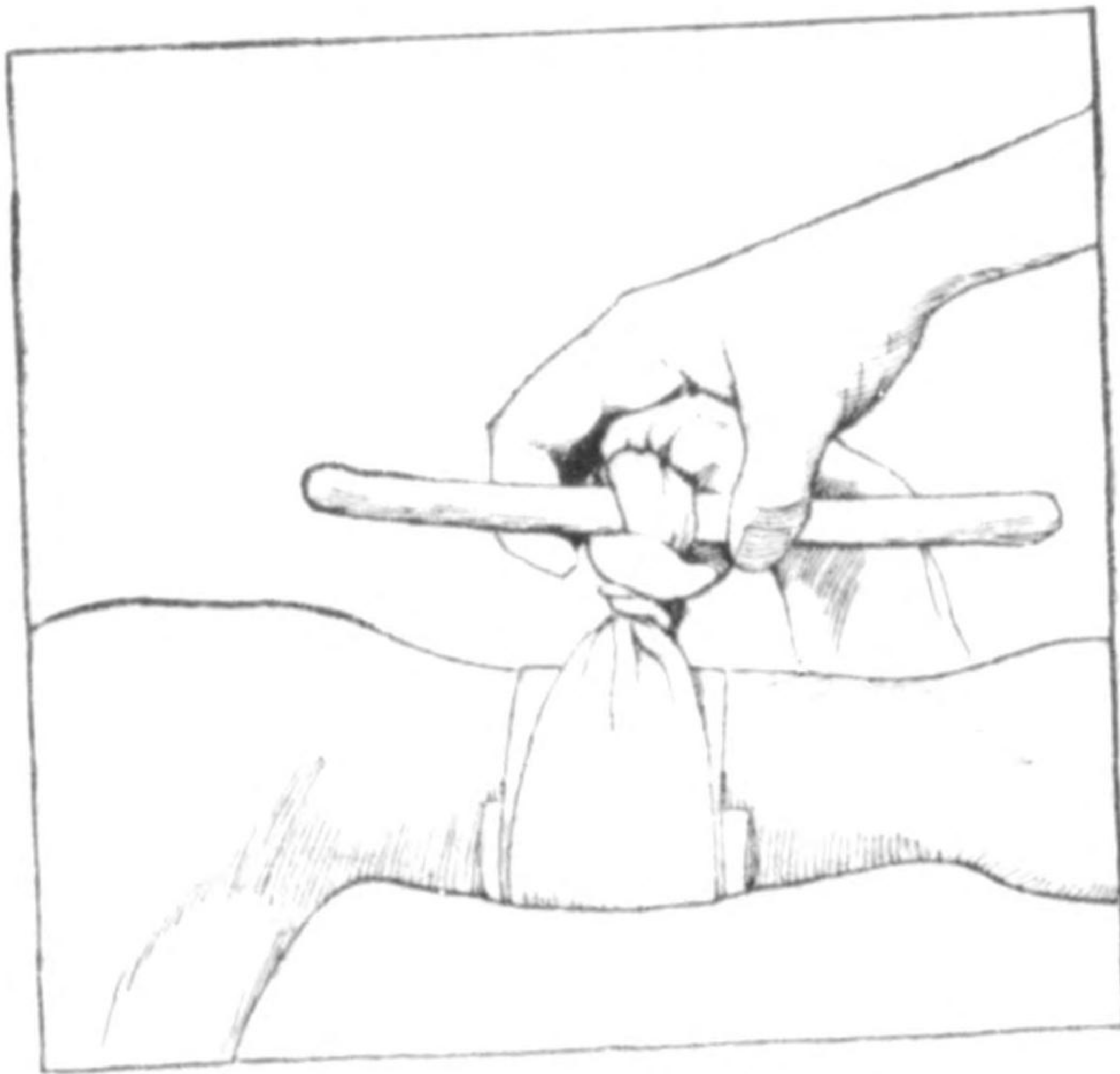
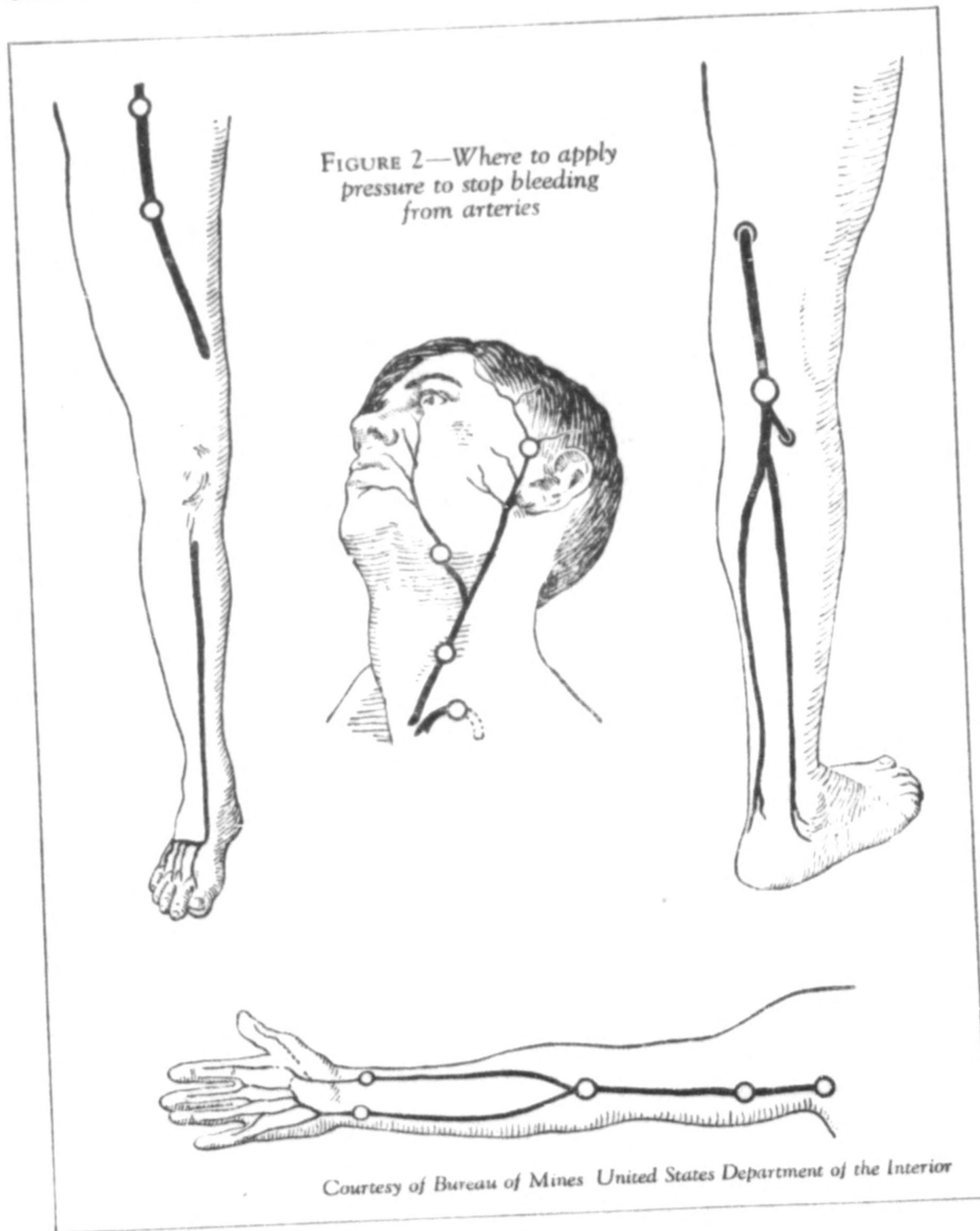


FIGURE 1—How to apply tourniquet to arm

methods described. On the arrival of the doctor, his attention should be called at once to the tourniquet. Any belt, strap, necktie, handkerchief, or similar article, which can be tied around an arm or leg over a pad, will serve as a tourniquet. Any firm pad, the size of an egg or a little larger, will do. The strap is

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tightened by twisting with a small stick or pencil until the bleeding stops (see Figure 1). The tourniquet is applied at the pressure spot nearest to the wound between the wound and the heart for arterial bleeding (see Figure 2) and at the pressure spot nearest

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to the wound away from the heart for bleeding from a vein.

Do not twist too hard—just enough to stop bleeding.

Loosen tourniquet every 20 minutes and let a little blood escape.

Never cover the tourniquet with a dressing.

Serious damage may be caused by blocking off the blood supply too long. If the bleeding has stopped when the tourniquet is loosened, do not again tighten, but have it in place in case the bleeding returns.

If there is severe bleeding from a place where a tourniquet cannot be used, *especially from the neck, groins, and armpits, press the fingers directly over the wound.* Replace the fingers, as soon as possible, with clean gauze, a freshly laundered, unstarched handkerchief, or other sterilized material.

Antiseptics

Small injuries, such as cuts and scratches, which probably will not be seen by a doctor, may be treated with an antiseptic, such as tincture of iodine (2 percent solution). When dry, apply a sterile dressing as described below.

If iodine is the antiseptic selected, it must be remembered that the concentration of the iodine solution increases with the age of the solution, owing to the evaporation of alcohol from the iodine. Therefore, solutions of long standing should not be used.

Dressings

Nothing should touch the wound except clean cloth or gauze which has been prepared for the purpose. Cloth or gauze so prepared is called a sterile dressing. A supply of these dressings (for sale at any drug store) should be kept in a covered container in every home. If none are at hand, take a piece of clean, unstarched cloth and iron it flat or boil it in water for 10 minutes. Old pieces of linen so treated make good dressings.

In putting on a dressing, care should be taken not to touch with the fingers, or any other object not sterilized, that part of the

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dressing next to the wound, and to make sure that the dressing is large enough to cover the wound completely. Hold the dressing in place by a bandage or adhesive tape.

The cleaning and disinfecting of all serious wounds should be left to the doctor. In cases of severe external bleeding, first-aid treatment stops with the checking of the bleeding and the application of a sterile dressing. Other wounds which should have the immediate attention of a doctor are as follows:

Puncture and Gunpowder Wounds

Deep wounds caused by narrow, pointed instruments, such as rusty nails and pitchfork tines; lacerated or contused wounds; and wounds caused by explosions of gunpowder, are particularly dangerous. Injuries of this kind may result in tetanus (lockjaw) unless they are taken care of by a physician. Besides treating the wound itself, the physician may wish to give tetanus antitoxin. Tetanus antitoxin must be given immediately to insure its effectiveness.

TETANUS IMMUNIZATION—Tetanus is caused by a germ which is found in animal manure, or in soil where animal manure has been thrown. It is a common inhabitant of the soil in many localities. Those whose occupations expose them especially to contaminated soils or to the danger of contracting punctured, lacerated, or contused wounds—for example, farmers, dairymen, soldiers, and workers in certain industries—may be immunized against tetanus by the injection of tetanus toxoid.

Snake Bite

Prompt action is important in every case of poisonous snake bite. The bite of a poisonous snake is rapidly followed by severe pain and, within 10 minutes, by swelling. Always see a physician as soon as possible, but in the meantime give first-aid treatment.

Have the patient lie down and remain quiet. Apply a ligature above the wound (see Figure 3) to keep the poison from spreading.

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Use whatever is at hand for making the ligature—a handkerchief, a piece of cloth, a necktie, etc. With the tip of a knife or razor blade, which has been passed through the flame of a match if possible, cut into the wound to insure bleeding and to let the

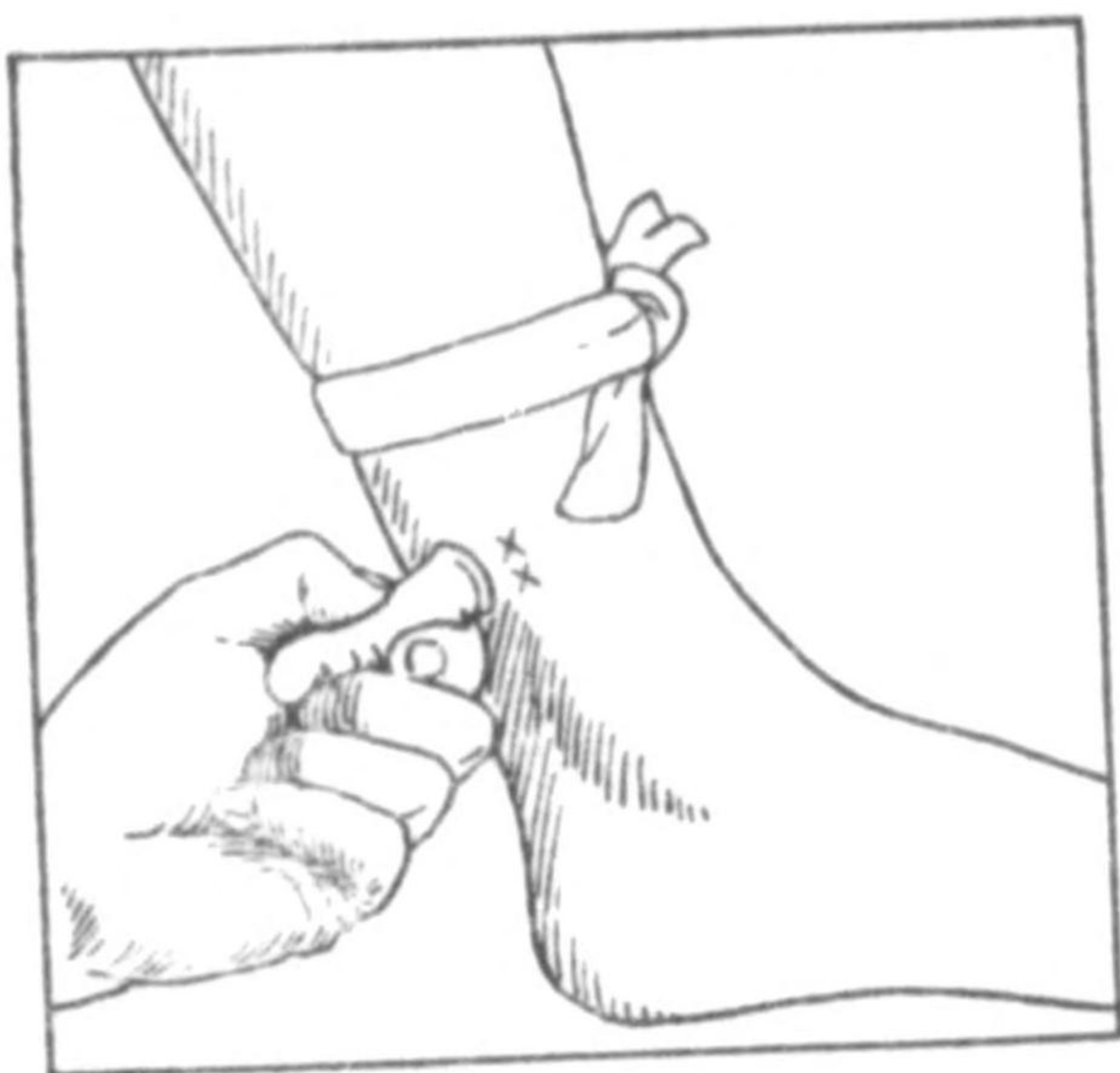


FIGURE 3—How to apply the suction device. Squeeze out all the air possible from the suction device and place its mouth over the crosscuts

poison out. Make a crosscut, in the shape of the letter X, from $\frac{1}{8}$ inch to $\frac{1}{4}$ inch in depth over each fang mark, preferably connecting the punctures. Then apply suction.

Several small devices for applying suction are available and may be carried in any first-aid kit. A simple suction device is pictured in Figure 3. When a special device is not available, use a wide-mouthed bottle, glass, or cup from which the air has been exhausted by burning a match or a small piece of paper in it. Suction also may be applied by mouth if there are no open sores or breaks in the lips or mouth and if care is taken not to swallow the poison. Suction should be continued for a full half-hour.

If it is available an antitoxic serum, known as antivenin, may then be given to counteract the effect of the poison.

Animal Bite

In all cases of animal bite there is a possibility that rabies or hydrophobia will develop. Rabies is spread mainly by the bite of rabid or mad dogs, but cats, squirrels, coyotes, cows, horses, swine, or, in fact, any warm-blooded animal, may have the disease and can give it to people in the same manner. Rabies is always fatal once it develops. Its development usually can be prevented by the Pasteur treatment.

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TREATMENT—The wound should first be washed under running water to remove the animal's saliva. Then go to a physician immediately so that he may give the wound the further treatment which is needed and decide whether to give the Pasteur treatment. This preventive treatment should be given in every doubtful case.

THE DOG—In case of dog bite, *do not kill the dog*, unless it is absolutely necessary, but turn him over to the city health department to be watched, or shut him up yourself for 14 days. If the dog remains well you may be sure he is not mad, and there is no danger from the wound, except the usual danger of infection common to all wounds. If the dog dies or is killed, pack his head in a pail of ice and send it to the nearest health department laboratory for examination. Should it be discovered that the dog was mad, the victim of its bite must be given the Pasteur treatment at once. Rabies may develop unless this precaution is taken.

Internal Bleeding

Internal bleeding—as into the brain, stomach, intestines—cannot be seen. It causes weakness, pallor, faintness, feeble and irregular breathing, and, later, loss of consciousness. While waiting for a doctor, treat as surgical shock (see the following paragraphs):

Shock

Most serious accidents and many slight ones may cause shock. *Shock is dangerous.* Treatment should begin immediately after any bleeding has been controlled.

SIGNS—The patient seems stupid and loses interest in what is happening, or he may be partly or totally unconscious. The skin is pale and covered with a cold, clammy sweat; the lips and nails may be blue. The pulse is rapid and hard to find; breathing is feeble.

TREATMENT—Send for a doctor. Lay the patient flat on his back with his head low, unless there is bleeding about the head,

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in which case the head should be raised slightly. Remove from the mouth removable false teeth, gum, or tobacco. Keep the patient warm with coats, blankets, and hot-water bottles or hot bricks or stones which have been covered with cloth or newspapers to prevent burning him. It is best to test the heat on your own forearm. Aromatic spirits of ammonia—a teaspoonful in a half glass of water—hot coffee, hot tea, or hot water may be used to stimulate the patient. But do not give any stimulants to an unconscious patient, or to a conscious patient who may have internal bleeding.

ASPHYXIATION

Any bodily injury which interferes with breathing may cause asphyxiation. Four common causes of asphyxiation are *electric shock, drowning, gas poisoning, and choking*. An asphyxiated person appears to be lifeless. Immediately after rescue, steps must be taken to restore breathing. The treatment necessary to bring this about is *artificial respiration*.

ARTIFICIAL RESPIRATION***The Prone-Pressure Method**

Lay the patient on his belly, preferably placing the head "downhill" on a 10- to 15-percent incline, with one arm extended directly overhead, the other arm bent at the elbow, and the face turned outward and resting on hand or forearm so that the nose and mouth are free for breathing. Make sure there is no obstruction to breathing. (See Figure 4, page 9.)

Kneel straddling the patient's thighs, with your knees placed at such a distance from the hipbones as will allow you to place the palms of the hands on the small of the back with fingers resting on the ribs, the little finger just touching the lowest rib, with the

*The method here given has been approved by the following organizations: United States Bureau of Mines, United States Public Health Service, United States Bureau of Standards, American Telephone and Telegraph Company, American Red Cross, American Gas Association, National Safety Council, National Electric Light Association, Bethlehem Steel Company, Bureau of Medicine and Surgery of the Navy Department, and Office of the Surgeon General, War Department.

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thumb and fingers in a natural position and the tips of the fingers just out of sight. (See Figure 4.)



FIGURE 4

With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. (See Figure 5.) Do not bend your elbows. This operation should take about two seconds.

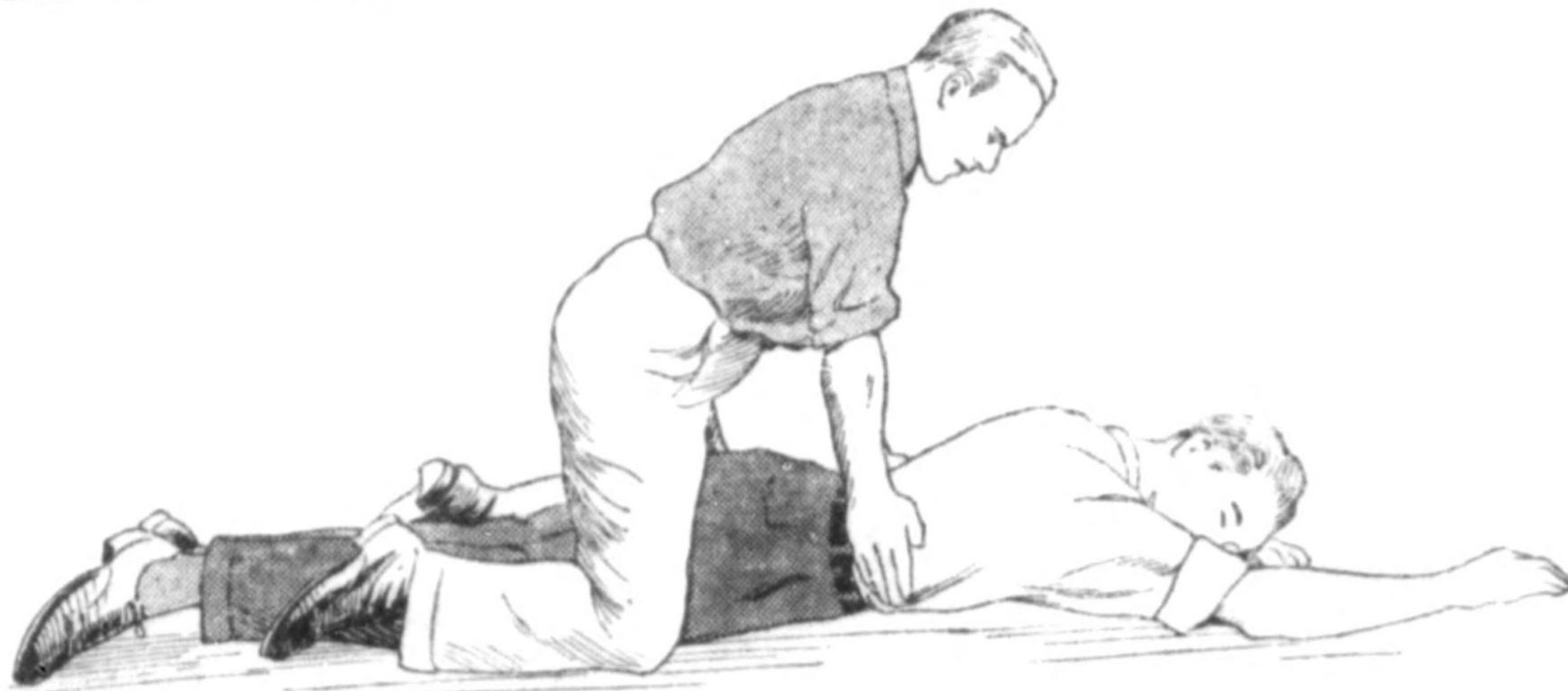


FIGURE 5

Now, immediately swing backward, so as to remove the pressure completely. (See Figure 6, page 10.) After two seconds, swing forward again. Repeat 12 to 15 times a minute, the double movement of pressing and letting go, making a complete respiration—drawing in and letting out of the breath—in four or five seconds.

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Continue without interruption until the patient breathes naturally; if necessary, four hours or longer, or until a physician declares the patient is dead.



FIGURE 6

As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest, or waist. *Keep the patient warm.* Do not give any liquids whatever by mouth until the patient is fully conscious.

To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, the latter should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea. He should be kept warm.

Resuscitation should be carried on at the nearest possible point to where the patient received his injuries. He should not be moved from this place until he is breathing regularly and then moved only in a reclining position. Should it be necessary, due to extreme weather, etc., to move the patient before he is breathing normally, artificial respiration should be kept up during the time that he is being moved.

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A brief return of natural breathing is not a certain indication for stopping the resuscitation. Often the patient, after a temporary recovery, stops breathing again. The patient must be watched; if natural breathing stops, artificial respiration should be begun again at once.

If it is necessary to change the operator, this change must be made without losing the rhythm of respiration. In this way, no confusion results at the time of change, and a regular rhythm is kept up.

Electric Shock

Electric shock occurs when an electric current passes through a person's body from a conductor of electricity to a ground. The conductor may be an electrically charged wire or rail, or a faulty electric fixture.

SIGNS—The victim of electric shock suffers sudden loss of consciousness, stopping of breathing, and severe burns where the conductor has touched the flesh.

RESCUE—Contact must at once be broken between the victim and the electrical conductor. Do not touch the victim's bare skin while he is still in contact with the current. It is as dangerous for you to touch his flesh as to touch the wire or rail itself. Turn off the current if you are near the switch or powerhouse. If this cannot be done, stand on a folded dry coat, or on newspapers or dry board, while with one hand (the hand should be protected with several thicknesses of dry cloth or newspaper) grasp a dry part of the victim's coat and drag him away from the wire or rail, if possible, or remove the wire from the victim, using a dry wooden stick. Another method of removing the victim found lying on an electrically charged wire or rail is to pull him off by looping over his foot or hand a piece of dry rope, belt, or handkerchief.

TREATMENT—After contact has been broken with the electrical conductor there is no danger of shock in touching the victim. A person who has been struck by lightning may be

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touched at once, since the electric charge has been expended into the ground. Artificial respiration should be started immediately after rescue (see page 8). Apply dressings to the burn (see page 17). Summon a doctor immediately.

Drowning

The majority of drownings occur close to shore, so that it is usually possible to save a drowning person if the rescuer has practiced life saving.

RESCUE*—The Red Cross has a slogan that is well worth remembering—"ROW, THROW, GO, TOW."

ROW—Use a boat, if available, or a plank or anything that is buoyant.

THROW—a life buoy or a rope to the drowning person.

GO—yourself when there is no equipment such as boats, life buoys, ropes, etc., at hand.

TOW—to safety by cross-chest carry, after approaching the drowning person from the rear, if possible.

Anyone who attempts to save a life in the water should be guided by the following common-sense rules:

A drowning person should be approached from the rear whenever possible to eliminate any chance of his grasping the rescuer.

If he is hysterical and struggling violently, swim a little distance away from him and wait there until he exhausts himself struggling or until he becomes calm, seeing assistance at hand.

Never attempt to strike a drowning person to knock him out. It doesn't work and it only frightens him more.

TREATMENT—A person rescued from drowning must be placed

*The life-saving methods recommended by the American Red Cross are recognized as the most efficient means of rescue. More detailed information than it is possible to include in this booklet can be obtained from *Life Saving and Water Safety*, published by the American Red Cross or by communicating with your local Chapter of the American Red Cross.

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as quickly as possible in the position described in paragraph 1 of the section on "Artificial Respiration" (see page 8). If the victim is *not breathing*, start artificial respiration at once. Either the rescuer or his assistant should quickly feel in the victim's mouth and throat and remove any obstruction to breathing found there, such as tobacco or false teeth. If the mouth is tightly shut, no attention should be paid to it until later. No attempt should be made to pry the jaws open. No time should be wasted in an effort to empty water out of the victim.

In numerous cases, breathing has been restored only after several hours of artificial respiration. It should be continued, if necessary, for at least four hours without any interruption. If possible, help should be summoned, but the rescuer should not wait for a doctor, or a policeman, or an ambulance to arrive; nor should he stop, if help *does* arrive, until he is relieved by someone competent to continue artificial respiration.

Gas Poisoning

The most deadly gas commonly met with is carbon monoxide. It is especially dangerous because, unless it is combined with other substances giving an odor, it cannot be smelled. Carbon monoxide may be due to ill-fitted water heaters and gas stoves, loose gas fixtures and valves, leaky gas tubing, and gas furnaces not connected to outdoor air by flues. It is also found in the exhaust gases from automobiles, and it is important to guard against the accumulation of these gases in enclosed places, such as garages. The motor of an automobile should never be started in the garage when the door is closed.

Many people think that accidental poisoning from illuminating gas happens only when there is a leak. This is not true. Carbon monoxide gas may be given off when the gas is burning. Natural gas, although normally not containing carbon monoxide gas, nevertheless may produce carbon monoxide when the flame comes in contact with cold metal, as when a large boiler of water is put over a gas flame.

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RESCUE—In rescuing the victim, make sure that you protect yourself against the gas. While the protective devices are on hand at police and fire stations, it may not be possible to wait for these. *Do not rely on a wet cloth over your mouth and nose.* Tie a rope around your waist and instruct someone on the outside to hold the other end and rescue you in case you fall.

TREATMENT—Get the victim to fresh air at once. If breathing has stopped or is weak, start artificial respiration (see page 8) and continue until breathing is regular or until the doctor pronounces him dead. Always give the patient oxygen, or the commonly used combination of oxygen and carbon dioxide, to breathe, if either is to be had and you have had training in its use. Police and fire departments and some hospitals have inhalators for giving oxygen. Keep the patient's body warm and aid circulation by rubbing the limbs toward the heart. Insist on the patient resting. Even slight exercise is dangerous.

Other gases, such as sulphur dioxide, hydrogen sulphide, etc., may cause asphyxiation and require similar treatment.

Choking

Rescue by quickly cutting any constriction around the neck or, if something is lodged in the throat or windpipe, pass a finger into the throat and hook the finger around the object in order to remove it. If the object is deeper down and cannot be removed by the finger, slap the victim vigorously on the back between the shoulder blades. While you are doing this, the victim can assist by lying crosswise on a bed on his abdomen with his head and shoulders hanging over the side. If the victim is a child, hold him upside down by the heels and slap his back.

TREATMENT—Send for a doctor at once, if these measures do not work. If, after the object has been removed, the patient is not breathing, start artificial respiration immediately.

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CHEMICAL POISONS

SIGNS—The signs and symptoms of chemical poisoning vary with the poison taken. Nausea, vomiting, pain, diarrhea, collapse, and convulsions are some of the possible immediate effects. Sometimes the patient becomes unconscious. When a poison has been swallowed, do not lose time trying to discover what the poison was. Every moment of delay means that more and more of the poison is being absorbed into the system. Unless prompt action is taken, the patient may soon be beyond help. Call a physician at once and, while awaiting him, start treatment.

TREATMENT—The specific treatment depends on the poison taken, but the general first-aid measures described below may be applied in all cases of poisoning except when a corrosive has been taken (see page 16) or when the patient is unconscious.

Dilute the poison and wash out the stomach by inducing vomiting. Both of these measures are accomplished by giving the patient quantities of lukewarm water to which may be added mustard or salt—in the proportion of one tablespoonful to a glass of water—or soapsuds. If it is still necessary to induce vomiting after the patient has swallowed several glassfuls of the fluid, tickle the back of his throat. Vomiting should be induced repeatedly until the fluid coming from the stomach is clear.

Antidotes

After the stomach is thoroughly washed out, give the proper antidote if you know what it is and if it is on hand. An antidote is a remedy which counteracts the effect of the poison. If the poison taken cannot be determined, whites of eggs or milk may be administered.

The antidote for many of the ordinary household preparations containing poisons is given on the container. Some of the poisons most commonly taken by mistake with their antidotes follow:

For Carbolie Acid (phenol):

Vinegar, soapsuds, or raw whites of eggs in water.

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For Bichloride of Mercury (corrosive sublimate):

Raw whites of eggs. Or give alum water, or mustard water, or salt water.

For Strychnine:

Potassium permanganate (in the proportion of one-fourth teaspoonful in one quart of warm water). Keep the patient quiet.

For Rat Poison and Fly Poison (usually contain arsenic):

Hydrated oxide of iron and magnesia, or mustard water, or salt water, or raw whites of eggs beaten up in milk.

For Matches:

Magnesia, or mustard water, or salt water, or raw whites of eggs. Give no oils.

For Iodine:

Starch in water, or bread and water.

For Sleep-inducing Drugs (codeine, morphine, opium, etc.):

Permanganate of potassium (one-third teaspoonful to one pint of water), or repeated drinks of strong tea or black coffee. Keep the patient awake.

For Corrosive Poisons:

Corrosive poisons, among which are strong acids and caustic alkalies, destroy the tissue. When a corrosive poison has been taken, the lips and tongue are stained or burned, and it is usually unwise to force vomiting. Give drinks of milk, milk and eggs beaten up together, or flour and water. If the proper antidote is at hand, it may be given first. Examples of corrosive poisons and their antidotes follow.

For Acids (hydrochloric, nitric, sulphuric, etc.):

Magnesia in warm water, or baking soda in water, or lime (scrape plaster from walls, if necessary) in water. A solution of soap is a good, and usually an available, antidote for corrosive acids.

For Caustic Alkalies (lye, soda, potash):

Olive oil; follow with diluted vinegar or lemon juice.

OTHER TREATMENT—If the patient ceases to breathe, apply artificial respiration (see page 8). Sometimes it is necessary to give treatment for shock (see page 7). Apply hot water bottles if the patient is prostrated. Keep the patient quiet to conserve his strength.

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Precautionary Measures

Label all medicines and preparations which contain poison. Do not take any medicine without first examining the label. Place poisons on a shelf separated from other medicines and drugs and, if possible, in a cabinet or closet that may be locked. Always keep poisons out of reach of children. It might be well to make a list of poisons with their antidotes and paste the list on the inside of the door of the medicine cabinet.

EFFECTS OF HEAT**Sunstroke (Heatstroke)**

Follows long exposure to hot sun or to intense heat indoors.

SIGNS—The patient is always unconscious. His skin is dry and hot, his face is flushed, the pupils of his eyes are enlarged.

TREATMENT—Remove the victim to a shady place and take off as much of his clothing as possible. Send for a doctor. Cool the body by cold sponges, using ice water, if possible. Keep this up until the patient becomes conscious. Then give him all the cool water he will drink. *Give no stimulants.*

Heat Exhaustion

Cooks, bakers, firemen, miners, and others who work in very hot places often have heat exhaustion.

SIGNS—The patient's skin is covered with a cold sweat. He is usually conscious. His breathing is shallow and rapid. He is generally pale and anxious looking. His pulse is feeble and rapid.

TREATMENT—Same as for shock (see page 7).

Burns and Scalds

Burns are classified and treated according to the degree of injury to the body tissues.

In first-degree burns, the skin is reddened and unbroken. Treatment is given primarily to relieve pain. A paste of baking soda in water; or cod-liver, olive, or castor oil; or vaseline should

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be applied and the burned area covered with sterile gauze.

In second- and third-degree burns, the skin is broken and danger of infection is great. A doctor should always be consulted. With extensive burns the patient develops severe shock and no time should be lost in placing him under the care of a physician. Any of the following substances are recommended for use in first-aid treatment: gentian violet jelly or a 1-percent aqueous solution of gentian violet; picric acid gauze; a 2- to 5-percent solution of tannic acid* or tannic acid jelly. If none of these are available, apply wet baking soda while waiting for the doctor. Do not use any oily or greasy substances or other material that might carry germs into the injury. Dress the same as a wound but keep the dressing moist. (See Dressings, page 4.)

Chemical burns are caused by chemicals such as strong acids and alkalis. Before applying any other treatment, they should be washed immediately with large quantities of clean water.

FIRE

If fire starts in your house or in a neighboring house, give the alarm promptly. Shut in the fire, if you can, by closing doors, windows, and transoms to prevent a draft. If the blaze is small, try smothering it with a coat, rug, or blanket, or use water on any but a gasoline blaze. The latter can only be smothered. If a fire extinguisher is handy, use it.

If a person's clothes catch fire, lay the victim on the floor at once and smother the flames with a heavy coat, rug, or blanket. Running about fans the flames and tends to drive them upward.

In escaping from a smoke-filled building, it should be remembered that the purest air is to be found near the floor level and it may be necessary to crawl to safety.

It may be necessary to treat the victims for burns (see above), and, in case they are overcome by the smoke and gases, artificial respiration should be given at once (see page 8).

*Tannic acid solutions should be fresh. To make, dissolve five teaspoonfuls of dry tannic acid powder in a glass of water. Tannic acid solution also can be made from tea. Use four teaspoonfuls of green or black tea to a cup of boiling water, steep for 15 minutes, and allow to cool before using.

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UNCONSCIOUSNESS

Some common causes of unconsciousness are the following:

Fainting

Fainting usually results from some mental excitement, such as fear, sight of blood, or emotional shock, but may accompany slight injuries or exposure to overheated rooms.

SIGNS—The patient becomes dizzy and weak and turns pale. He either sinks into a chair or falls unconscious.

TREATMENT—If you notice a person is going to faint, you can sometimes revive him by bending his head down between his knees. If he does not improve, lay him flat on his back and lower his head by raising his hips. Loosen all clothing around the neck and waist. See that he gets plenty of fresh cool air. Sprinkle cold water on his face and neck or hold a handkerchief containing a few drops of aromatic spirits of ammonia to his nose every minute or two. When consciousness returns, the patient should continue to lie quiet for a while before getting up.

Apoplexy

SIGNS—Apoplexy is commonest in elderly people. The patient may seem to be intoxicated. He is usually unconscious and snores.

TREATMENT—Send for a doctor. Lay the patient on his back and raise his head and shoulders. *Do not give stimulants.* Cold cloths may be applied to head and back of neck. If the patient vomits, turn his head to one side so that he will not choke.

Epilepsy (Fits)

SIGNS—An epileptic fit is marked by strong jerking movements of some or all of the victim's muscles, and saliva may run from the mouth. The patient is unconscious.

TREATMENT—*Do not try to restrain the victim's movements* more than is necessary to prevent him from hurting himself. Lay the

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patient on his back and loosen tight clothing. Place a pad or small stick between his teeth to keep him from biting his tongue. Take anything from his mouth which might choke him. Keep him warm with blankets or coats. Send for a doctor.

Note—If an individual has been drinking an alcoholic beverage and becomes unconscious, his condition may be mistaken for alcoholism when it is actually due to something more serious, such as apoplexy, uremia, or the effects of an injury. Send for a doctor if such a person has been in an accident or if a departure from his usual behavior while under the influence of alcohol raises any doubt as to the cause of his stupor. Then put the patient to bed and keep him warm.

FRACTURES (Broken Bones) AND DISLOCATIONS

A fracture, or broken bone, when there is no break in the skin, is called a simple fracture. When there is a wound as well, it is called a compound fracture. Careless first-aid handling of a simple fracture may cause the splintered ends of the broken bone to cut through the tissues and skin, thus making the injury a compound fracture.

Fractures of the Arms and Legs

SIGNS—The patient complains of pain at the place where the bone is broken, and the pain is more severe on pressure or movement. He may not be able to move the limb. The broken ends of bone may be overlapping noticeably or the injured limb may be shorter or bent when compared with the uninjured side. Swelling is usually marked and appears quickly.

TREATMENT—When in doubt, treat as a fracture. Send for a doctor. If there is shock or a wound, treat as described under these headings. If it is necessary to move the patient, a splint must be applied to keep immovable the broken parts of the bone.

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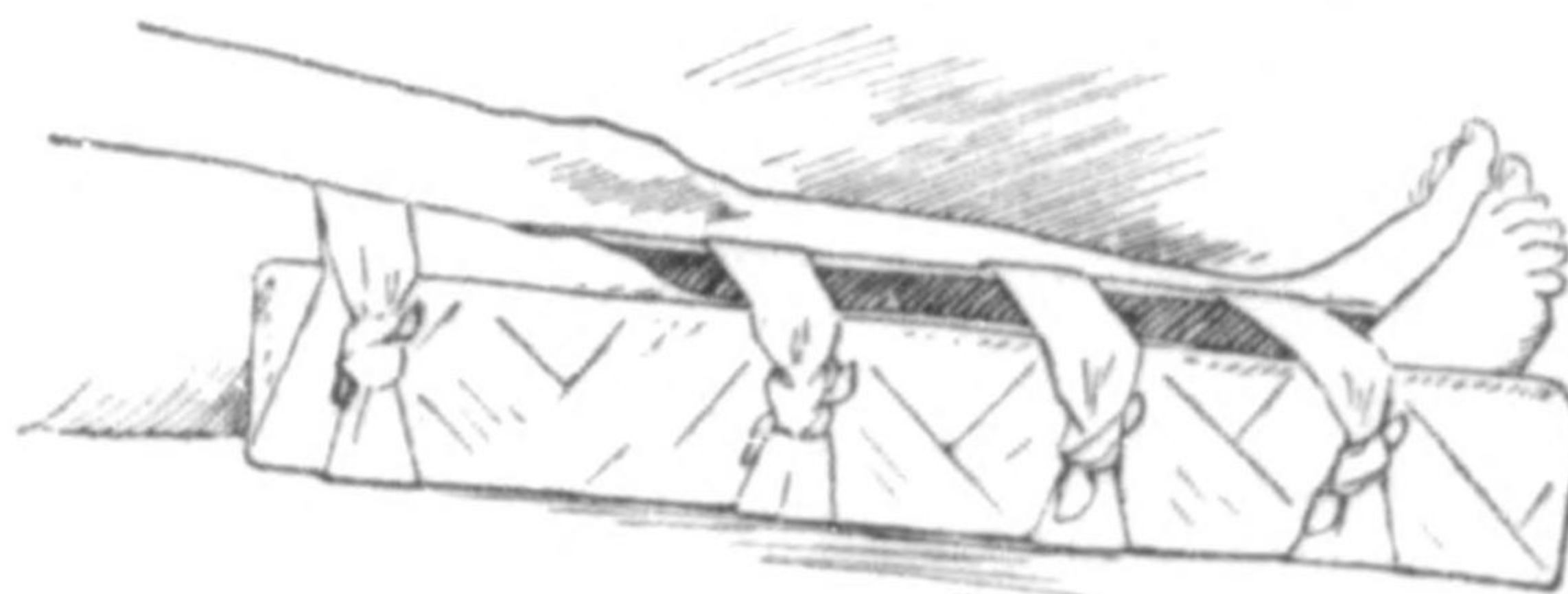
Courtesy of Bureau of Mines, United States Department of the Interior



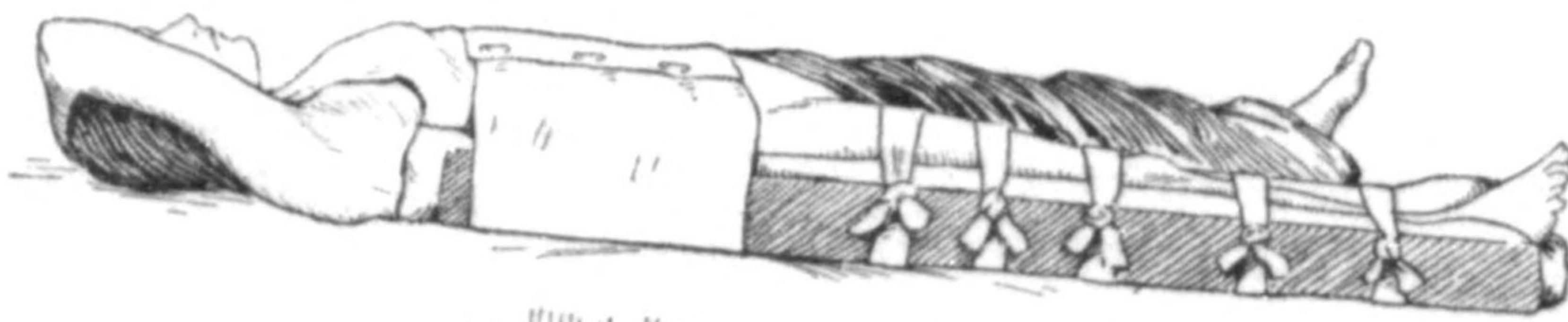
Splint for broken forearm or wrist



Splint and sling for broken upper arm



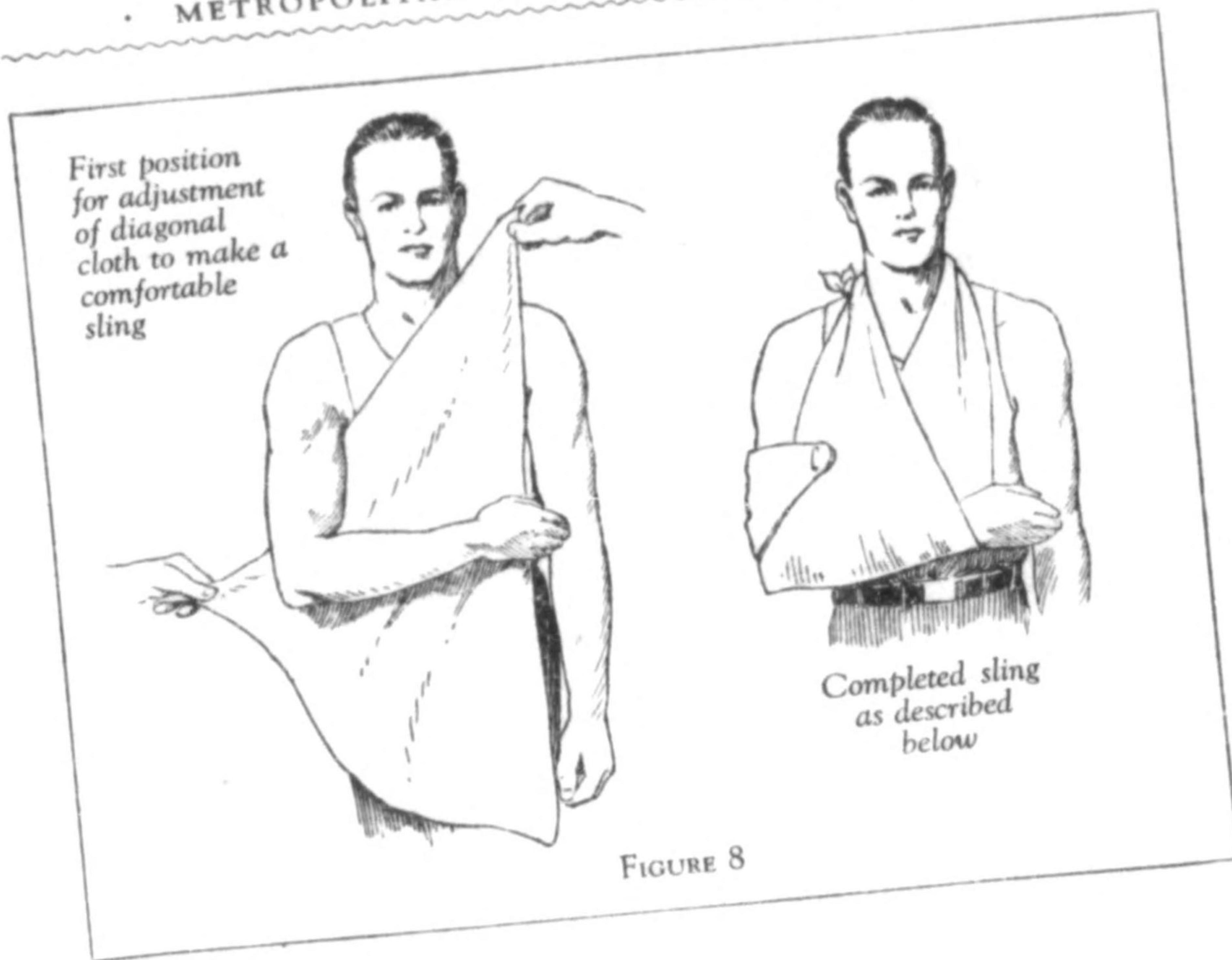
Splint for broken lower leg



Splint for broken thigh

FIGURE 7

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Splints

Any rigid material—a light board, umbrella, cane, broom handle—that is long enough to reach beyond the joints above and below the break, will serve as a splint. Pad the splint thickly with cloths, excelsior, hay, newspapers, pillows, or leaves, and cover with cloth. Bandage to the broken limb firmly, but gently, along its length, but not over the fracture. (See Figure 7, page 21.)

Fractured Collarbone

SIGNS—As the patient stands or sits straight, the shoulder on the injured side hangs much lower than the other shoulder.

TREATMENT—Place a large pad under the armpit. Make a triangular sling bandage from a piece of cloth about 2½ feet square. (See Figure 8.) Support the arm on the injured side by the sling. Tie the ends of the bandage behind the neck and pin the middle end across the front piece. Let the doctor complete the treatment.

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Fractured Spine

This injury is serious. The patient should not be moved unless it is absolutely necessary, and then *extreme* care should be used. Otherwise, the broken ends of the spine may pinch the spinal cord, thus causing paralysis from the fracture downward.

SIGNS—Extreme pain in the back and legs with numbness or tingling. The patient may not be able to move his feet and legs. Deformity may be present at the point of fracture.

TREATMENT—Send for a doctor at once. Place the patient in a comfortable position. If his back is bent, do not try to straighten him. If moving is necessary, keep him in the same position. Use a board or improvised stretcher for moving, so that the patient may remain reclining. Two or three people will be needed to lift or slide him onto the stretcher, so as not to disturb his position. Place pillows around his back, so that he can lie comfortably without moving his back muscles.

Fractured Skull

SIGNS—If the patient received a blow on his head or a severe fall and seems stunned or is unconscious, there may be a fracture of the skull, and the patient should be treated accordingly.

TREATMENT—Send for a doctor. Check severe bleeding, if present, by placing a gauze compress over the wound. There may be a fracture, however, when there is no visible wound. Lay the patient flat on his back, with the head slightly elevated. Keep him warm. Give him nothing by the mouth.

Dislocations (Bone Out of Place at the Joint)

SIGNS—The joint looks out of shape when compared with a similar joint, and its motion is limited.

TREATMENT—Send for a doctor. Do not try to replace the joint; merely place it in a comfortable position. For pain, apply to the joint cloths frequently wrung out in very cold water.

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Treatment of Dislocation of Finger and Lower Jaw

(The only dislocations you may attempt to replace in emergency.)

FOR DISLOCATED FINGER—Face the injured person and pull the end of the finger toward you. With the thumb and forefinger of the other hand, gently press on the dislocated joint until it slips into place.

FOR DISLOCATED JAW—Wrap your thumbs in several thicknesses of cloth to protect from the patient's teeth. Then put your covered thumbs into the injured person's mouth, resting them on his lower teeth well back on each side, while your fingers grasp the jaw under the chin. Press first downward and then backward. As the jaw closes, slip the thumbs off the teeth to the inside of the cheeks, so they will not be caught between the teeth when the jaw springs into place.

SPRAINS, STRAINS, AND BRUISES**Sprains**

When the ligaments supporting the joints or attaching the muscles to bones are torn, a sprain is the result. There is pain, swelling, and usually discoloration. What seems like a bad sprain may be a fracture. Therefore, a doctor should be called for a sprain, unless it is slight.

TREATMENT—Raise the injured joint, so that it will get less blood. Apply first hot then cold cloths for several hours. Bandage snugly to prevent motion, but loosen bandage frequently if swelling increases.

Strains

A strain is like a sprain, but it is the muscles, not the ligaments, which are injured.

TREATMENT—Relieve the pain by putting the part to rest. Light massage (rubbing the limb upward toward the body) is helpful. When the pain quiets down, deeper and firmer massage may be used.

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Bruises

A bruise is an injury usually caused by a fall or a blow. The skin is not broken, but the tissues under the skin are injured, resulting in the breaking of small blood vessels.

SIGNS—Pain, swelling, and black-and-blue marks. A black eye is a bruise.

TREATMENT—Apply cloths wrung out in cold water. When the skin has already become black and blue, use hot water applications for half an hour, three times a day. If the blow was severe, have a doctor examine the patient.

REMOVING FOREIGN BODIES

Foreign bodies which become lodged in the eye, nose, or ears may cause great distress. The greatest care must be used in removing them.

A Foreign Body in the Eye

Instruct the patient not to rub the eye. Have him close it gently, in the hope that the tears may wash the speck out, or into view, so that it can be removed. With the use of a medicine dropper, wash the eye with clean water or boracic acid solution. If still unsuccessful, turn the lower lid down and look for the speck. If it can be seen, remove the speck gently with the corner of a clean handkerchief. If the speck cannot be seen or is lodged in the upper eyelid or on the eyeball, removal is difficult and a doctor should be consulted. If the eye is very painful, soak a soft cloth in cool water and bandage this in place over the eye, while waiting for the doctor. A doctor should always see the patient if the eyeball is injured.

A little castor oil dropped into the eye after a speck has been removed is soothing.

Acid, lime, and other chemicals entering the eye should be immediately washed out with great quantities of clean water. Follow with two or three drops of olive or castor oil and cover with a moist compress until the patient is seen by a doctor.

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A Foreign Body in the Ear

Children sometimes put shoe buttons or other small articles into the ear. Always have a doctor remove them, unless they drop out readily. If an insect enters the ear, put a drop or two of castor oil or sweet oil into the ear and call a doctor.

It is dangerous to remove wax from the ears by poking with sharp instruments, such as matches, toothpicks, or hairpins. If wax is troublesome, see a doctor.

A Foreign Body in the Nose

Children have the habit sometimes of putting objects into the nose as well as into the ears. If the object can be seen, it can usually be removed without much trouble, but if the attempt is unsuccessful, see a doctor. Care should be taken not to use force.

Foreign Bodies Swallowed

If the patient has swallowed some sharp article, like a piece of broken glass or a pin, encourage him to eat mashed potatoes and bread. These will surround the foreign body and may prevent it from injuring the intestines. For further treatment, see a doctor.

HOME CARE OF COMMON AILMENTS**Earache**

See a doctor at once for earache or for a discharging ear. Deafness or mastoid disease may result if you neglect this. Do not put anything into the ear. It may cause serious infection.

Nosebleed

Slight nosebleed does no harm and does not require much treatment. Pinching the soft part of the nose may help. If bleeding continues, call a doctor at once. While waiting, make a cotton plug and gently push it with the end of a pencil into the nostril from which the blood is coming. In babies and in old people, bleeding from the nose may be dangerous; a doctor should be called.

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When bleeding is severe, put the patient in a chair with his head slightly forward. Loosen the collar. Apply cloths wrung out in cold water to the back of the neck.

Some authorities recommend that the head be tilted backward, but this position makes it difficult to apply cold cloths to the back of the neck, and the patient frequently becomes nauseated or vomits due to swallowing blood. With the head tilted slightly forward, the cloths may be applied properly, and the first-aid worker can observe when the bleeding stops.

Frostbite

The signs of frostbite are whiteness and numbness of the flesh; the skin feels cold to the touch.

The method of treatment to be applied depends upon individual circumstances. The object is to insure a gradual return of normal circulation of the blood through the frostbitten area. Frostbite frequently can be prevented by maintaining circulation through the exposed part by rubbing or by covering it with a warm skin surface or clothing. If the victim of frostbite cannot immediately find shelter, cover the affected areas with clothing or, if this cannot be done, apply heat through the hands or other body surface until circulation is restored. If the victim enters a warm enclosure, care must be taken not to expose the frozen part to a high degree of heat. Apply heat gradually by bathing the part with cold water. Rubbing of the area should not be done so hard as to damage the skin, which, in severe frostbite, may easily be injured.

Toothache

Go to your dentist as soon as possible. A drop of oil of cloves on a bit of cotton inserted into the aching cavity may give temporary relief from pain, but will not cure the decayed tooth. See your dentist every six months, even if your teeth seem all right.

Sties

A sty may be caused either by eyestrain or ill health. A doctor should be consulted. A cloth wrung out in hot water and applied to the eye may ease the pain.

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Boils

These result from an infection through a slight wound in the skin, due to scratching, shaving, etc. Boils are common in people with certain diseases, such as Bright's disease, diabetes, tuberculosis, poor circulation, and indigestion. Hot applications of water or antiseptic solutions may be used to relieve pain. A doctor should always be consulted.

Sunburn

This may be treated like any other mild burn. Baking soda and water, ordinary vaseline, or carbolated vaseline may lessen the discomfort. If sunburn is severe or the patient appears sick, see a doctor.

Insect Bites

The bite or sting of such insects as bees, mosquitoes, flies, or spiders often causes swelling and inflammation. To relieve the discomfort, apply weak ammonia water and, later, cloths wet in cold water.

Ticks

The tick is a blood-sucking insect prevalent in the spring and summer. It is responsible for the spread of several diseases, one of which is Rocky Mountain spotted fever. The danger of infection is somewhat minimized by the early removal of the insect.

The tick has a small toothed probe on the head with which it pierces the skin and fastens upon the flesh of its victim. Unless the tick is carefully removed, the probe may break off and remain embedded in the flesh. When removing the tick, make sure that the probe is included. The grip of the insect may be released by applying kerosene or gasoline. The tick may then be removed with a forceps or with the fingers protected with a piece of cotton. Or, sterilize a needle and puncture the skin. The hot needle usually brings out the tick. Then apply iodine to the bite. Use a toothpick to do this and insert the toothpick slightly into the wound.

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Ivy, Oak, and Sumac Poisoning



Poison ivy (common east of the Rocky Mountains), and poison oak (common on the Pacific Coast) have leaves divided into three leaflets

"Leaves three; let it be!" is a warning that may well be heeded by town dwellers making excursions into the woods and fields.

Wherever the skin of a susceptible person comes in contact with leaves of poison ivy, poison oak, or poison sumac, the skin becomes red and swollen, and an eruption of blisters occurs, accompanied by painful itching and burning. Scratching and rubbing may cause the spread of the eruption to other parts of the body. In severe cases, fever may be present.

PREVENTION—After exposure, thorough washing with soap and water often prevents poisoning. In some instances, immunity against ivy poisoning is temporarily procured by the injection of an immunizing preparation. A highly successful preventive treatment is described in an article appearing in *Science News Letter*, June 13, 1936. This consists of a 5-percent solution of ferrous sulphate in a half-and-half mixture of water and alcohol, with a little glycerin added.* Apply this solution to all parts of the exposed skin before going into the woods. Do not rinse or wipe the skin; let the solution dry in place.

TREATMENT—Puncture the blisters and swab out the contents with sterile gauze. Then moisten with a 5-percent solution of potassium permanganate in water, or apply a dressing soaked in a cold sodium bicarbonate solution. Application to the affected part of such agents as the following has given relief in many instances: Soluble collodion; a 5-percent solution of ferric chloride; or calamine lotion, to which enough carbolic acid has been added at the drug store to make a 2-percent solution. In case of severe ivy poisoning, see a doctor.

*Take a 6-ounce bottle, put in 2 teaspoonfuls of glycerin, add 2 ounces of alcohol plus 1 teaspoonful of ferrous sulphate. Add 2 ounces of water and shake until the ferrous sulphate is dissolved.



Poison sumac (a low tree found in eastern boglands) has a compound leaf of from 7 to 13 leaflets and pale, waxy berries in season

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THE MEDICINE CHEST

FOR THE HOME—In every home there should be certain first-aid materials and medicines, carefully selected, carefully labeled, and kept in a cabinet made for the purpose. This cabinet should be placed well out of the reach of children. Medicines prescribed by a doctor should be kept here and not left standing around the house. When the special need for which they are prescribed is passed, such medicines should be thrown away. The following articles should be kept always on hand:

- A Clinical Thermometer*—For taking temperature.
- First-aid Dressing*—Including sterilized gauze for wound dressings, gauze bandages to hold dressings in place, and a roll of adhesive plaster. A number of individual first-aid dressings will be found very useful. These can be purchased in any drug store.
- Alcohol* (for rubbing)—Six ounces. Use externally to relieve the pains of sprains, strains, bruises, and to refresh the skin during an illness.
- Aromatic Spirits of Ammonia*—Two ounces. One-half teaspoonful in some water for faintness.
- Boric Acid*—Four ounces. Dissolve one teaspoonful in a glass of hot water and use as an eyewash.
- Carbolated Vaseline*—One tube.
- Plain Vaseline*—One tube.
- Castor Oil*—Eight ounces. Dose—one to two tablespoonfuls.
- Oil of Cloves*—For toothache.
- Tincture of Iodine*—2 percent or individual ampoules.
- Syrup of Ipecac*—Dose, one teaspoonful, followed by a drink of warm water, to cause vomiting.

FOR TRAVELING—Small first-aid packets, which can be purchased from many druggists or hospital supply companies, will be found useful and occupy but little space in a traveling bag. These packets should be part of an automobile equipment. On camping trips, the equipment should be more elaborate and contain the necessary remedies for burns, ivy poisoning, and snake bites.

FOR SMALL WORKSHOPS—A metal cabinet containing the following minimum equipment placed in a conspicuous location and

FIRST AID

under the definite supervision of some member of the organization who has had first-aid training is suggested:

- Individual package-type sterile dressings.
- Individual package-type finger dressings, 1½-inch compresses.
- Individual package-type 3-inch compresses (also a few 4-by 6-inch).
- Assorted gauze bandages of various widths.
- Tourniquet.
- Scissors, pair.
- Absorbent cotton, package or roll.
- Splints of yucca or similar material.
- Aromatic spirits of ammonia—ampoules best suited for first aid.
- Iodine, individual ampoules.
- Adhesive tape, safety pins, and any special equipment for particular type of treatment found necessary in certain industries.

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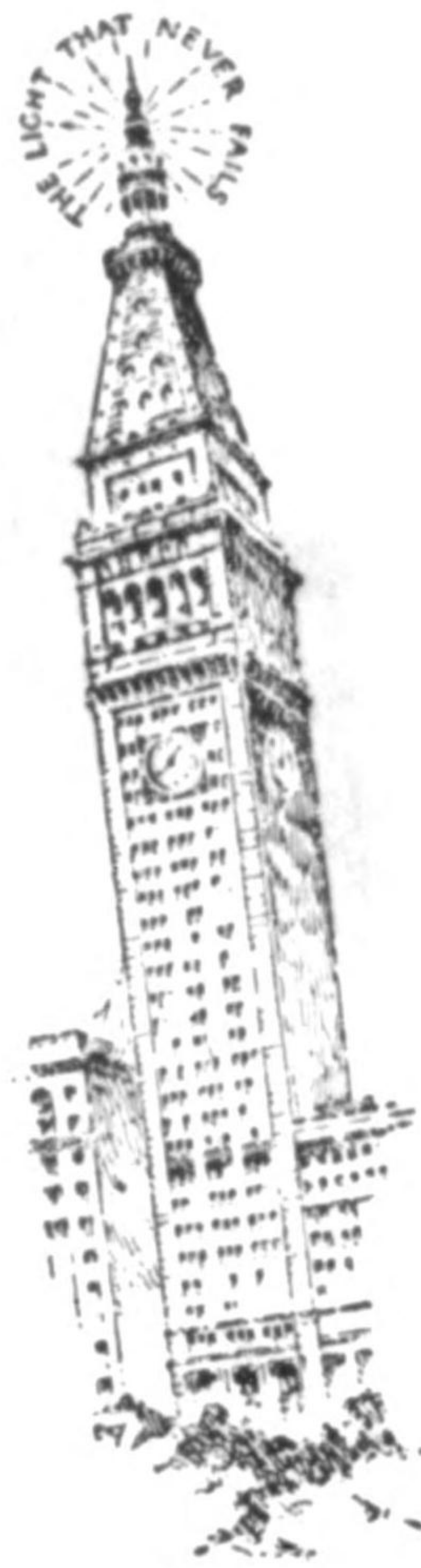
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**Teaching
Aids ~**

**by
Maternity Center
Association**

**654 Madison Avenue
New York 21, New York**

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Second Edition, 1944. \$5.00.

Sixteen life-size reproductions of photographs of the famous Dickinson-Belskie series of plaster sculptures. They depict the baby at 4, 6, 7 weeks; 2½ months; 3½ months; 4½ months; 7 months and at term. Five plates show the birth sequence, two more depict the gradual return of the uterus to normal size and position and one shows twins — identical and fraternal. The birth sculptures are accurate in every detail. In binder with easel back for classroom use 17" by 22". The second edition contains two new plates — one showing the baby at 4½ months and the other on twins. These new plates are available separately at 25¢ each, postpaid.

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An up-to-date and different book for expectant mothers, teachers and young people who want to know just how babies come. It answers the expectant mother's questions about the selection of good care, fitting a new baby into the home, preparation for delivery, care of the baby, etc. Ninety interesting and helpful illustrations.

Getting Ready to be a Father

by Hazel Corbin. Macmillan Company, 1939, \$1.25.

A book that will answer a man's questions, give him confidence, make him helpful to his wife before and after the baby comes, and the proudest father in town! In light conversational style.

Maternity Handbook

by the Maternity Center Association. G. P. Putnam's Sons, 1932, \$1.00.

A useful book for expectant mothers and fathers, cram full of practical information about maternity.

Maternity Center Association

A short history of the Association's first quarter century of work for safe maternity. It tells of the broadening scope of obstetrics in the U. S. 1943, ~~\$1.00~~ 84 pp.

Blue Ribbon Baby

A New Set of Educational Charts

\$1.00 for the set.

A series of 8 charts teaching that safe and satisfying maternity is not only dependent upon good medical and hospital care during the nine months of pregnancy but is influenced by habits of living and attitudes of mother and father even when they were children themselves. The posters tell the story by means of photographs and simple cartoon drawings. The captions are in jingle form, easy to read and understand. Colorful and decorative. Useful for class discussion, also for exhibits and display in clinic waiting rooms, etc. 18" by 22".

A Companion Leaflet

which tells in more detail the story of the relation of the coming of a baby to all of family living. With miniature reproductions of the posters, and on facing pages, short stories about each — just enough to stir up thinking and to bring out questions for discussion in class or in personal interview by the nurse or the teacher. 16 pp. size 4" by 5½", \$5.00 for 100; \$35.00 for 1,000; 10¢ for single copies.

For Expectant Mother

~~\$5.00~~ for 100; 5¢ for single copies.

Simple 8-page leaflet of practical suggestions for expectant mothers.

For Expectant Father

~~\$5.00~~ for 100; 5¢ for single copies.

Simple 4-page leaflet of practical suggestions for expectant fathers.

Out of Print

Maternity Care in Pictures — 31 Teaching Charts.

This popular series will soon be replaced by a new and up-to-date set of charts.

Routines and Briefs for Mothers' Club Talks.
Now replaced by Public Health Nursing in Obstetrics, Part IV.

First in Your Thoughts.

4-page leaflet on emergency delivery.



After a friendly talk about the mother's health habits since childhood, her state of mind, followed by a complete medical examination and a trip to the dentist, the doctor, mother and father work out together her prescription for living during pregnancy.

prescription for living



for Expectant Mother

THOSE months of pregnancy can be some of the happiest and healthiest in your life. Most women feel as well as they ever did; many feel better. You can confidently expect to be at your best during pregnancy if you, your husband and the doctor have worked out together your prescription for living—and then **IF YOU LIVE IT!**

That prescription for living isn't only setting down a list of rules about diet and rest, work and play—important as these rules may be. It is compounded, too, of your attitude toward life, your husband and your coming baby. That attitude can have much to do with determining how well you feel and how well your body functions. Because you are emotionally keyed up, there may be times when you feel weepy, edgy, afraid, depressed and irritable—a sort of balancing let-down from the elation you usually feel. Don't let a low mood upset you. Do something you like to do and the mood will soon pass.

You, Your Doctor and Hospital

You and your husband will want to select a doctor who limits his practice to the care of expectant mothers. If such a doctor is not available, then choose the one who does most of the baby-bringing in your community. Medical science has learned so much in the past few years to protect you when you are having a baby. Only those doctors who keep abreast of these marvelous advances can bring you the security you should have in these important months.

Just as there are different grades of potatoes or anything else you buy, so there are different grades of hospitals. Some are good, some are fair, and some are poor. If you plan to have your baby in a hospital, be sure that

The first signs of labor may be vague abdominal discomfort, pink-streaked mucus or watery discharge, a feeling of tenseness or hardening or tightening of the abdomen as the uterus contracts. This feeling comes and goes at regular intervals. If you have a discharge, any bleeding or contractions at any time during pregnancy, call your doctor at once and go to bed. Stay in bed until he tells you what to do.

When you call the doctor, have these answers to his questions ready. When did the contractions begin? How often do they come? How long do they last? Are they accompanied by pain? Have the membranes ruptured?

You have confidence in your doctor because you have selected one who has training and experience in baby bringing. Now let him take over. He will tell you what to do. He will know if you need anaesthesia, analgesia, when to give it, and what to use.

Make it easy for the doctor to help you. If, by any chance, something does not seem just right, don't worry about it—call him and tell him. Don't fail to call your doctor if you have—headaches, chills and fever, sore throat, colds, spots before the eyes, swelling of hands and face, nausea and vomiting, nervousness and anxiety, bleeding.

Reward

Baby's arrival tests the strength of your love for each other and your plans for his coming. To you, baby will be no diapered dictator for he and his care will be fitted into your family life, with time for fun, rest and work.

For the first fourteen days after your baby's birthday, when your body is making a marvelous adjustment to a new state of existence, rest will be your most important job. After the first ten days or two weeks, you can take

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your doctor can take you to one which is approved by the American College of Surgeons. To get that approval, a hospital must have a separate maternity department with individual care and equipment for every mother and baby.

What About Mothers' Class?

In every mother's heart are the same questions about her baby. What is he like now? Boy or girl? About herself—what changes are taking place within her body during pregnancy? How is the baby conceived? How does he grow? How is he born? About her family life—how to plan for the baby's coming. About the care of the baby. At mothers' class, the why and how of everything is made clear. Find out if and where mothers' classes are being held in your town. Your visiting nurse, your doctor or the local health department can tell you.

To Market, To Market!

A balanced diet that is right for your husband is right for you, too, during pregnancy. As your baby develops, you may need a little more of certain foods, a little less of others, at different stages in his growth. Every so often, mother and doctor review her eating habits to make sure that she is getting enough meat, fish, milk, eggs, cheese, as well as cereals, fruits and vegetables. So—off to market! The exercise is just what the doctor ordered.

She Looks as Radiant as She Feels

Every expectant mother needs to learn how to relax when she takes her extra rest periods during the day—a cat nap, a short time with a good book or the radio. Good posture when you sleep and rest, as well as when you work and walk and sit becomes more important as

your weight increases and you try to keep your balance as your shape changes.

Maternity clothes are now well designed for an expectant mother's comfort and appearance. A well-fitted maternity corset will help to prevent fatigue and that "oh, my aching back" feeling. A good bra, too, will help to support the breasts. Rolled stockings with round garters and other tight bands are out. But there is no argument against going stockingless, and none against permanents, shampoos, facials or manicures. You can be as well groomed and chic as your non-expectant sister, and you have an added radiance that can't be bought in a beauty shop.

Baby's Things Are Few and Sensible

Every mother expresses herself when she chooses her baby's things. Streamlined for comfort and easy handling, the layette can focus attention on the baby's simple needs and still be charming. Your baby's clothes should be designed to keep him clean, comfortable, sweet, happy, safe and socially acceptable. They should allow for growth and be easy to wash and keep clean, soft, porous, light in weight, warm and durable. They should allow for adjustment to heat and cold without undue handling, be easy to put on and take off and not interfere with free activity.

Knowledge of Labor Banishes Fear

For the mother who learns from her doctor or nurse, at mothers' class, or by reading a good book what happens during labor and exactly what the doctor and nurse do while the baby is being born, everything about the baby's birth is interesting and thrilling. With fear banished, she is relaxed and so the natural processes of labor and delivery are not interfered with.

The first signs of labor may be vague abdominal discomfort, pink-streaked mucus or watery discharge, a feeling of tenseness or hardening or tightening of the abdomen as the uterus contracts. This feeling comes and goes at regular intervals. If you have a discharge, any bleeding or contractions at any time during pregnancy, call your doctor at once and go to bed. Stay in bed until he tells you what to do.

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For the first fourteen days after your baby's birthday, when your body is making a marvelous adjustment to a new state of existence, rest will be your most important job. After the first ten days or two weeks, you can take

care of your baby, but you should have help with the housework because you have not yet regained your full strength and endurance.

Now We Are Three (or more)

The good health of the whole family is one secret of a happy family. Living together is more fun when everybody is well, so a new mother does everything in her power to stay well. This includes seeing the doctor when your baby is six or eight weeks old and working out together a new prescription for living that will deepen the satisfactions and joys.

Your baby is part of your home team. He thrives best when you, your husband and your children live in harmony. On the LITTLE things of life—the tone of a voice, the warmth of a smile, the foundations of family living stand.

GOOD READING

- HEALTHY BABIES ARE HAPPY BABIES by Dr. Josephine H. Kenyon, Little Brown & Company, 1943
- A WOMAN'S HEALTH by Dr. William C. Danforth, Farrar and Rinehart, 1941
- EXPECTANT MOTHERHOOD by Dr. Nicholson J. Eastman, Little, Brown and Company, 1940
- GETTING READY TO BE A MOTHER by Carolyn C. Van Blarcom, revised by Hazel Corbin, Macmillan, 1940
- OURSELVES UNBORN by Dr. George W. Corner, Yale University Press, 1944
- WE, THE PARENTS by Sidonie Gruenberg, Harpers, 1939
- ALL ABOUT FEEDING CHILDREN by Dr. Milton J. E. Senn and Phyllis K. Newell, Doubleday, Doran and Company, 1944
- BABIES ARE HUMAN BEINGS by C. A. and M. M. Aldrich, Macmillan, 1938
- INFANT AND CHILD IN THE CULTURE OF TODAY by Dr. Arnold Gesell and Frances L. Ilg, Harpers, 1943

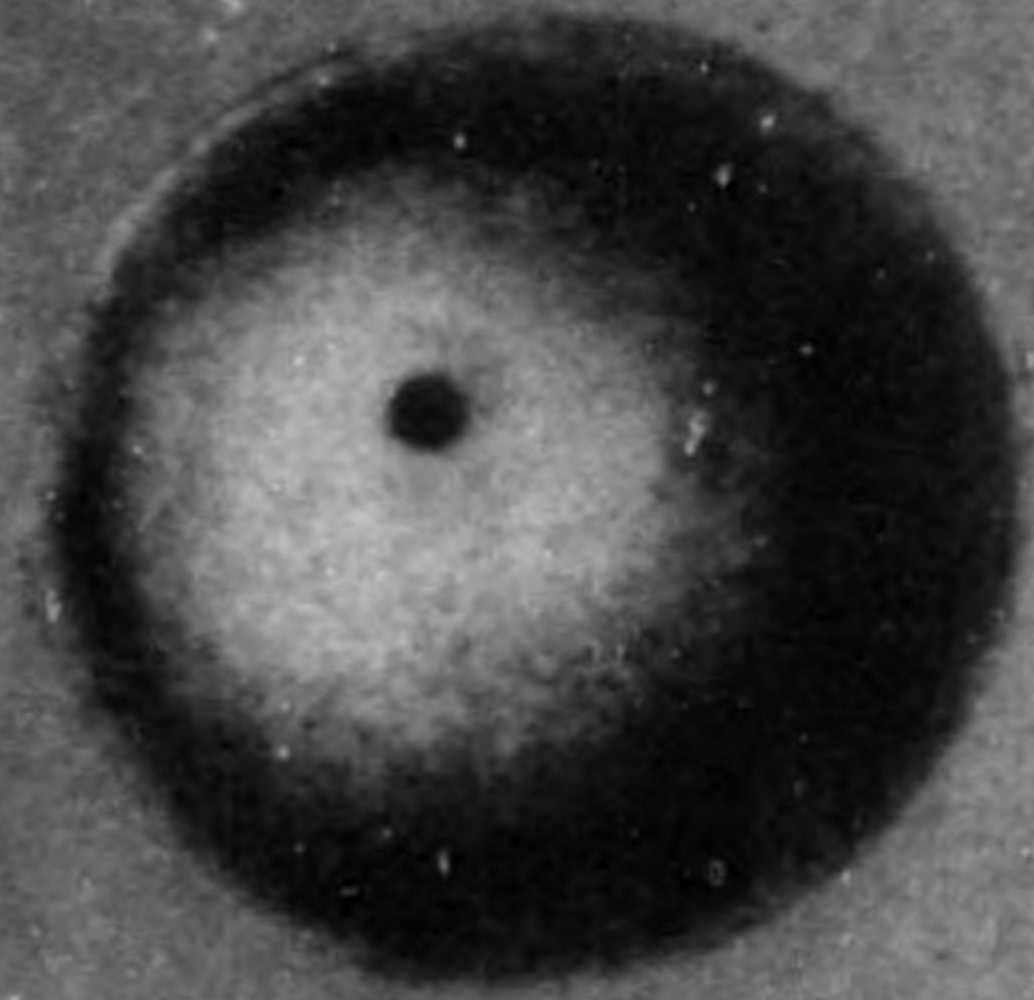
Published and copyrighted by Maternity Center Association, 1946
654 Madison Avenue, New York 21, N. Y.

HOW DOES YOUR BABY GROW?



Long before a baby is even dreamed of, some of the influences that will affect his personality, his health and happiness are already in the making. These things are determined long before his parents have met, fallen in love and married! His physique, his general health, even his disposition are largely dependent on the kind of people his parents are. Do they really want children? Do they get a kick out of life? Are they happy and well? Do they make a point of learning how to live together happily, of finding out how to be good parents? Will they continue to grow with the years? Will the coming of their baby bring out their best qualities; give them new motives for living and cement them more closely together?

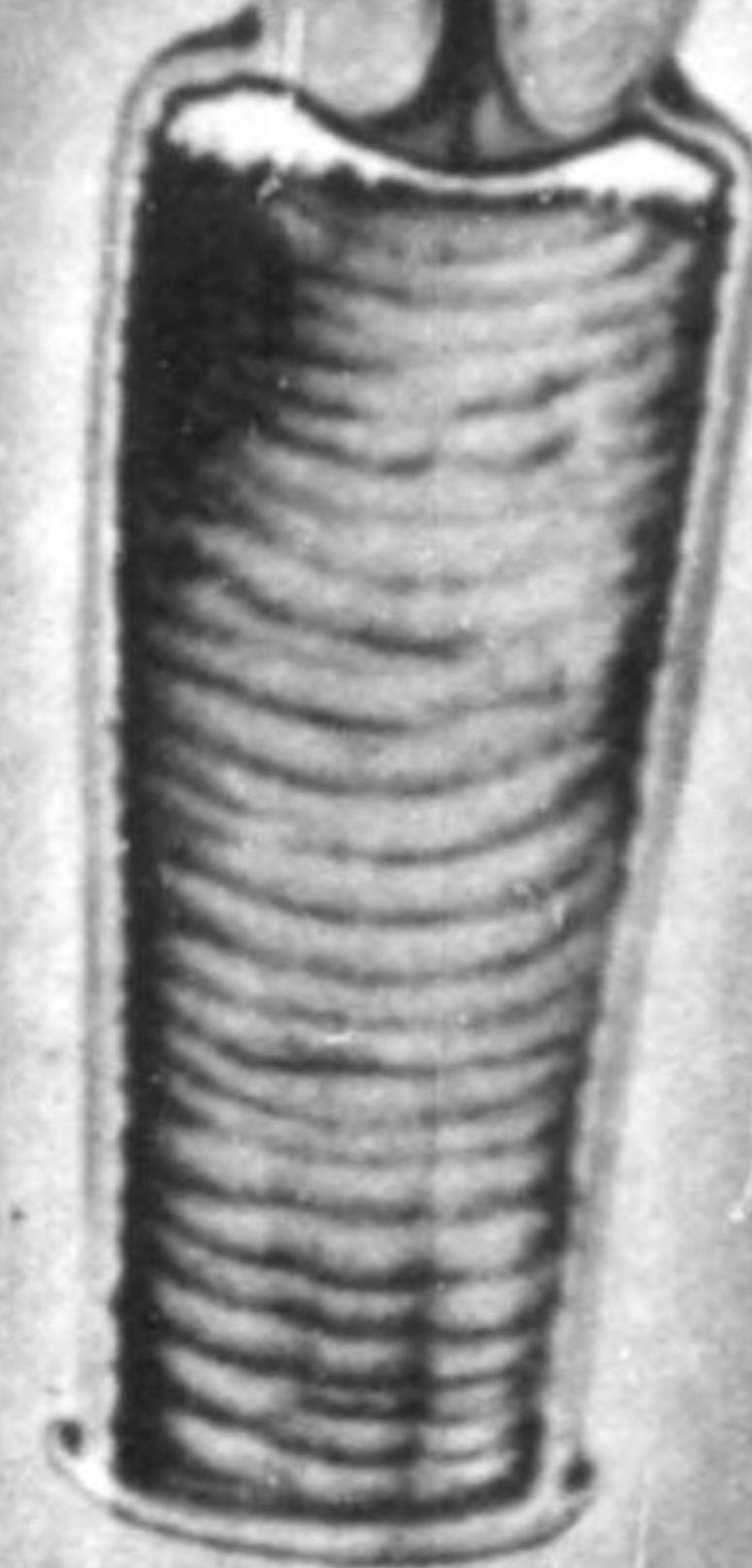
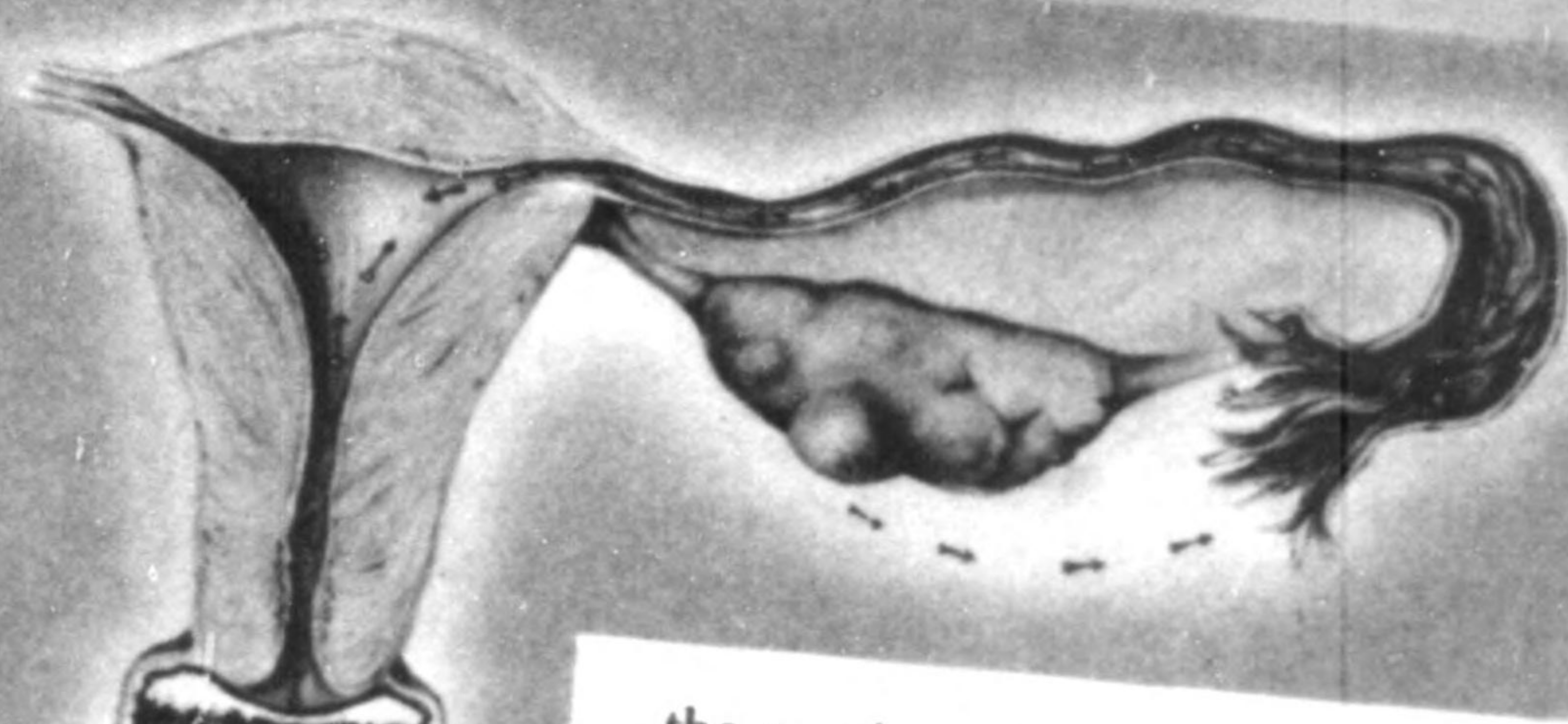
A NEW LIFE BEGINS . . .



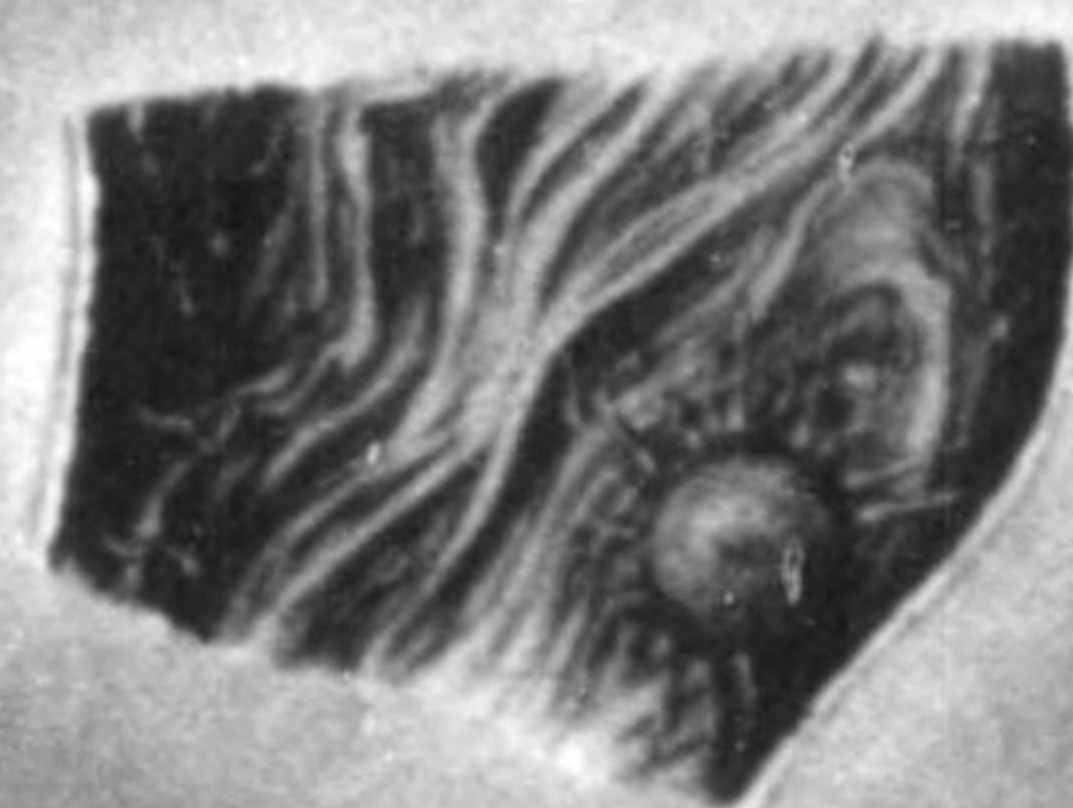
A BABY'S LIFE begins at the very moment the sperm (from the father) unites with the ovum (from the mother) in the fallopian tube, deep in the mother's body. You see in picture 1 the sperm and ovum — magnified many times. The ovum is no larger than the point of a fine needle and the sperm is too small to see without a microscope.

Will the baby be a boy or a girl? Whom will he look like? What type blood will he have? Will it be Rh- or Rh+? What kind of a person will he be? Part of the answer to all these questions is found in the little dot in the ovum, called the nucleus, and in the head of the sperm. Everything that he will inherit from his father's and his mother's families is determined there. His whole heritage is forever fixed when these two cells join together. The rest of the answer lies in the response of these inherited tendencies to the influences of his environment — the atmosphere in his home, his family relationships, his care, his food, his play, his school, his church, his associates, his work, etc.

In picture 2 you see the mother's uterus (womb), one fallopian tube and one ovary. On the other side of the uterus (not seen in the drawing) is a similar tube and ovary. The uterus opens into the mother's vagina. Here the sperm are deposited by the father — millions of them — in a special fluid. Up through the uterus the sperm travel into the fallopian tubes and out toward



2



2a

the ovaries. It takes the sperm about an hour, more or less, to complete the journey. You can follow their route by the white-tailed arrows. The black arrows show the travel of the ovum from the ovary into the fallopian tube, where it meets the sperm.

In picture 2A you see the sperm surrounding the ovum (both greatly magnified). One successful sperm finally enters the ovum. The rest of them pass out of the picture.

The successful sperm merges so completely with the ovum that together they form a single new cell, called the fertilized ovum. That new cell begins at once to develop. Without growing any larger, it divides into two cells, then four, then eight, etc., as it is propelled through the fallopian tube to the uterus. It takes about three days for the fertilized ovum to become a cluster of cells and reach the uterus. Then that cluster of cells begins to grow. A cavity appears inside the cluster; the cluster becomes a sac.

Some of the cells form the wall of the sac; others are set aside within the sac to develop into the body of the baby. The sac absorbs through its wall some of the fluid that oozes into the cavity in the uterus to nourish the baby. Within four to six days after the cluster of cells enters the uterus, the sac begins to attach itself to the lining of the uterus. Next, the sac sends out little root-like processes into the mother's tissues to absorb from her blood the further nourishment needed by the developing baby.

At the time the mother misses her first menstrual period, the fertilized ovum has probably been growing for about two weeks and is a sac just about the size of a BB shot or a small bead. You see it in picture 3. Two weeks later, the baby is beginning to take form; eyes and ears have already started to develop; his heart is beating and his blood is circulating. The baby has the beginnings of arm and leg buds. See him within the sac in picture 4.

The next week is one of rapid growth. See in picture 5 the great changes that have occurred in just seven days! His life-line is the tiny umbilical cord. This contains the blood vessels that convey his blood to the developing placenta or after-birth.

There, his waste will be transferred to his mother's blood in exchange for food and oxygen, the hormones and vitamins, on which he grows and develops.

At eight weeks, the baby has the beginnings of all his organs. His head has grown more rapidly than the rest of his body, so it seems to be out of proportion. He has eyes, nose and mouth, fingers and toes. Bones are beginning to harden, muscles to form, and the baby can move. See him in picture 6.

At twelve weeks, he really looks like a baby, with his eye closed. He has short arms and legs, his fingers and toes are well formed and his nails are beginning to grow. The baby teeth are well started in the gums. See in picture 7 how much the baby has developed in this early period.

Before he is twenty weeks old, the mother has felt his movements and the doctor has heard his heart-beat.

By the time the baby is twenty-eight weeks old, he is about fourteen inches long and weighs about two pounds. His body structure and organs are well formed. His fingerprints are all set for life. The fat which soon will give the baby his chubby, rounded appearance is beginning to form beneath the skin. If he



3



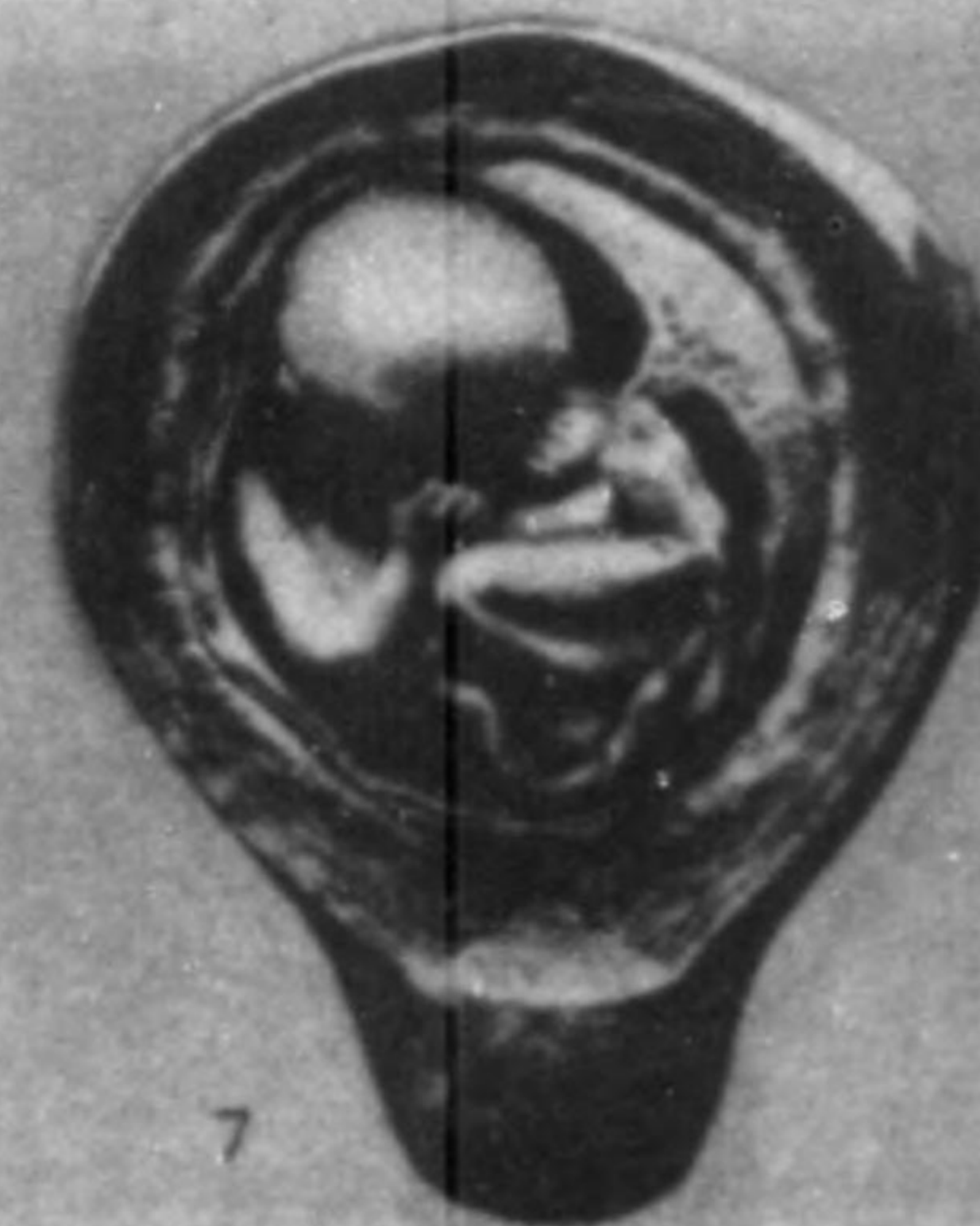
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6



7

should be prematurely born, his chances are good if given the best of care in an incubator.

When the time for birth rolls around, the baby has grown about six inches taller and weighs about seven pounds. He lies curled up in the uterus in the position that takes the least possible space. Most babies are born head first, in the position shown in picture 8.

Now while this baby is growing within his mother, he must be carefully tended. That means his mother needs special care — father's biggest job! If his wife is well and happy and not over-tired; if she has the right food, the chances for a healthy baby are excellent. So are the chances for a safe, comfortable and beautiful experience during the nine months of pregnancy, the birth of the baby and afterward.



EXPECTING A BABY? Don't delay, Go to a Doctor right away!



Choose a doctor who has
experience and training in
maternity care.



PRESCRIPTION FOR LIVING

FIRST there is a friendly talk about the mother's health-habits since childhood, and present state of mind; this is followed by a complete medical examination and a trip to the dentist; the doctor and mother work out together her prescription for living during pregnancy. The doctor checks blood pressure, temperature, pulse, weight. He examines nose, throat, breasts, hands, feet, heart, lungs, blood, urine, abdomen and pelvis.

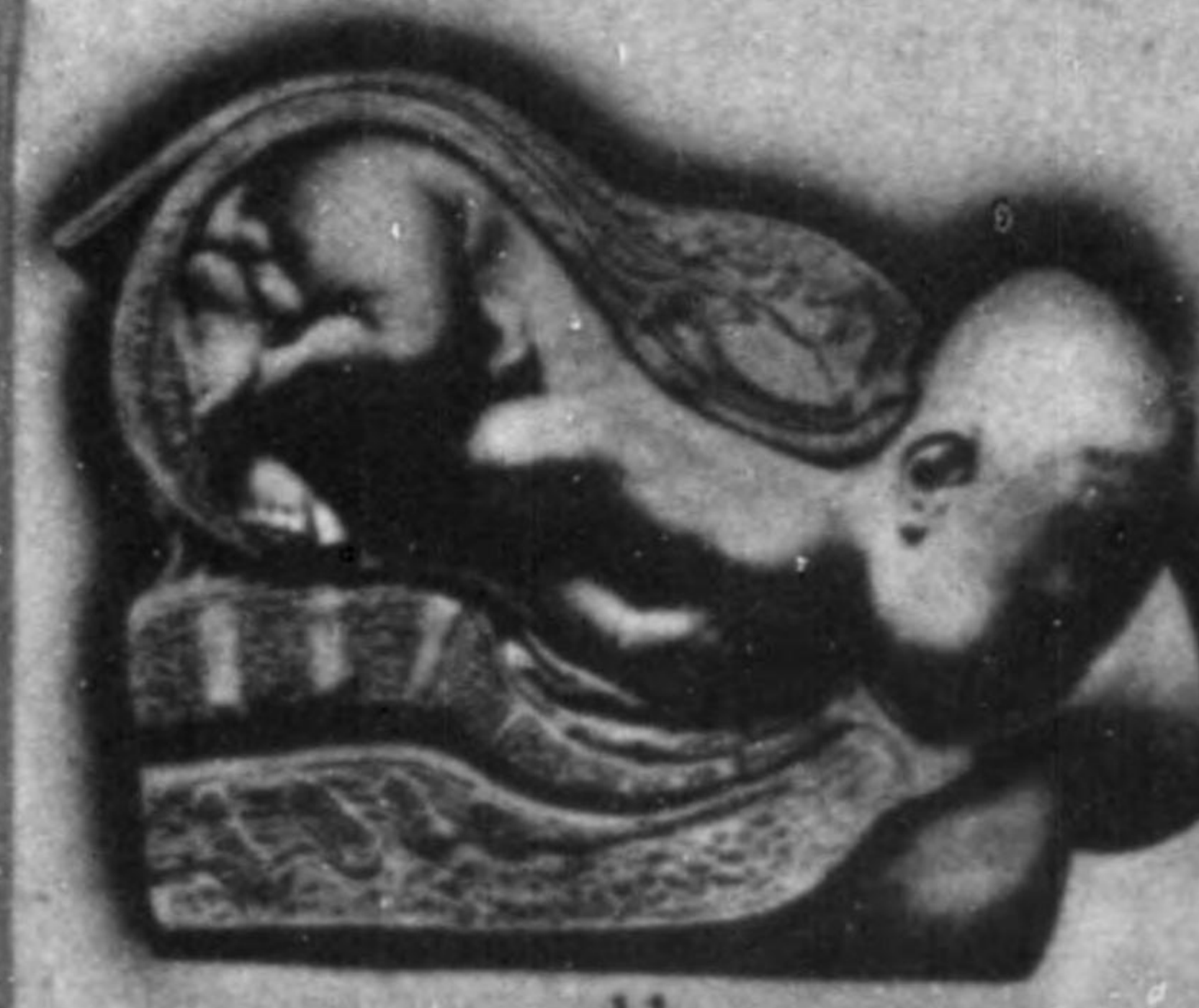
THE BIRTH of a BABY!



BIRTH! What a thrilling time it is! Pictures 10, 11 and 12 show you how a baby is born. In these pictures, the mother is lying on her back. Do you see her spine? Notice how the baby turns as he is being born. First the motion is downward, then upward and outward. See the bag of waters in advance of the baby's head coming down the birth canal in picture 10. Later, after the membranes or bag of waters are broken, the baby's head emerges. See picture 11. Soon the shoulders follow and the baby is here. See picture 12 — a dramatic moment — birth!

For weeks and months after birth, mother and baby are under the watchful eye of the doctor. Baby's best food is an old-fashioned recipe — mother's milk. Lucky is the baby who gets the added protection of the food which nature has provided, and the loving, intimate contact with his mother. Lucky is the mother who is able to nurse her baby because his food is always ready, always the right temperature, always sterile. Remember, too, that nursing a baby helps to restore the mother's youthful figure.

The doctor will soon recommend a gradual addition of other foods to make him strong and husky — orange juice, cod liver oil, cereal and strained fruits, vegetables and custards. The care the baby gets now is very important to his future life, so a wise



mother follows the doctor's orders to the very letter. Let the doctor be the guide — let him decide.

The good health of the whole family is one secret of a happy family. Living together is most fun when everybody is well. So a new mother does everything in her power to stay well, for the sake of her baby, her husband and herself. This means seeing the doctor AFTER the baby comes and working out together a prescription for living that will deepen the satisfactions of motherhood.

Baby's needs are few and simple but they must all be met. They can be met when baby's life is planned around the family's life. Then baby is no diapered dictator who rules the family roost. Then, too, mother and father will have time to enjoy life with their friends and take part in community activities.

In addition to the advice and guidance which the doctor gives to expectant parents, there are other sources of help in a community. The public health nurse can be a real friend in need. She knows a lot of little shortcuts that will make baby care a part of family living. In many communities, there are classes for expectant parents conducted by the Visiting Nurse Association, and by the Health Department. There are also many helpful books on the care of mothers and babies. See inside back cover for a few of them.

**IF I ONLY
HAD A BABY!**

SOME young people get married, planning a large family but after a year or two are bitterly discouraged that no babies have come their way. Do not give up and say, "What is to be will be." Few couples are really sterile. In the majority, a combination of conditions in the man and woman cause a reduced fertility. Avoid quacks and patent medicines; they waste your money and raise false hopes. Go to a doctor who specializes in overcoming infertility, or to a clinic in a good hospital. They provide no cure-all. But they can tell you what to do after thoroughly examining both husband and wife. They often find minor difficulties that can easily be overcome, and many couples who have given up all hope of ever having a baby find themselves happy parents after all.

**ABORTIONS
ARE DANGEROUS!**

SOME young people get married and plan to have their babies when they can provide them with a comfortable home and the things that make life happy. But their plans are balked by an unexpected pregnancy. What to do? In their desperation, they turn to the professional abortionist — a discredited doctor.

Little do they know what abortions may do to people. Frequently women become seriously ill from infection. Many of them seem to feel no ill effects, at the time, but may find that when they *do* want babies later on they are sterile. They cannot conceive; or they may have one "miscarriage" after another. So they live with unhappy memories of what might have been.

If you are thinking about an abortion — stop! Go to your family doctor. Talk it over with him. Remember, some women get pregnant only once in a lifetime!

MATERNITY HANDBOOK

by Maternity Center Association
Published by G. P. Putnam's Sons

GETTING READY TO BE A FATHER

by Hazel Corbin
Published by The Macmillan Co.

GETTING READY TO BE A MOTHER

by Carolyn C. Van Blarcom
Revised by Hazel Corbin
Published by The Macmillan Co.

HEALTHY BABIES ARE HAPPY BABIES

by Dr. Josephine Kenyon
Published by Little, Brown and Company

WE, THE PARENTS

by Sidonie Matsner Gruenberg
Published by Harper & Bros.

The U. S. Children's Bureau, Federal Security Agency, Washington 25, D. C., publishes two very important free leaflets: "Prenatal Care" and "Infant Care."

Prepared by

MATERNITY CENTER ASSOCIATION

654 MADISON AVENUE, NEW YORK 21, NEW YORK

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As a mother of five children, I have a real appreciation of the new responsibility which will come into your life when your baby comes. Happily, the question of what to feed your baby is solved by serving Gerber's Baby Foods — Cereals, Strained Foods, and Chopped Foods — all prepared under the supervision of infant nutrition experts.

Mrs. Jean Gerber



A #
TWENTY-NINTH
BIENNIAL REPORT
July 1, 1944 - June 30, 1946

HEALTH IN NORTH DAKOTA

NORTH DAKOTA
STATE DEPARTMENT OF HEALTH
BISMARCK, NORTH DAKOTA

Twenty-Ninth
BIENNIAL REPORT

July 1, 1944 to June 30, 1946



FRED G. AANDAHL
Governor

GEORGE F. CAMPANA, M.D., M.P.H.
State Health Officer

North Dakota
State Department of Health
Bismarck, North Dakota

BUY "DAKOTA MAID" FLOUR



775013

STATE DEPARTMENT OF HEALTH
Bismarck, North Dakota

September 15, 1946

Honorable Fred Aandahl
Governor of North Dakota

Dear Governor Aandahl:

In accordance with Section 23-0106 of the Public Health Law, it gives me great pleasure to transmit the Biennial Report of the North Dakota State Health Department for the Period ending June 30, 1946.

Respectfully submitted,

WILLIAM M. SMITH, M.D.
Acting State Health Officer

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THE STATE OF NORTH DAKOTA
State Department of Health

GEORGE F. CAMPANA, M.D., M.P.H.
State Health Officer

June 30, 1946

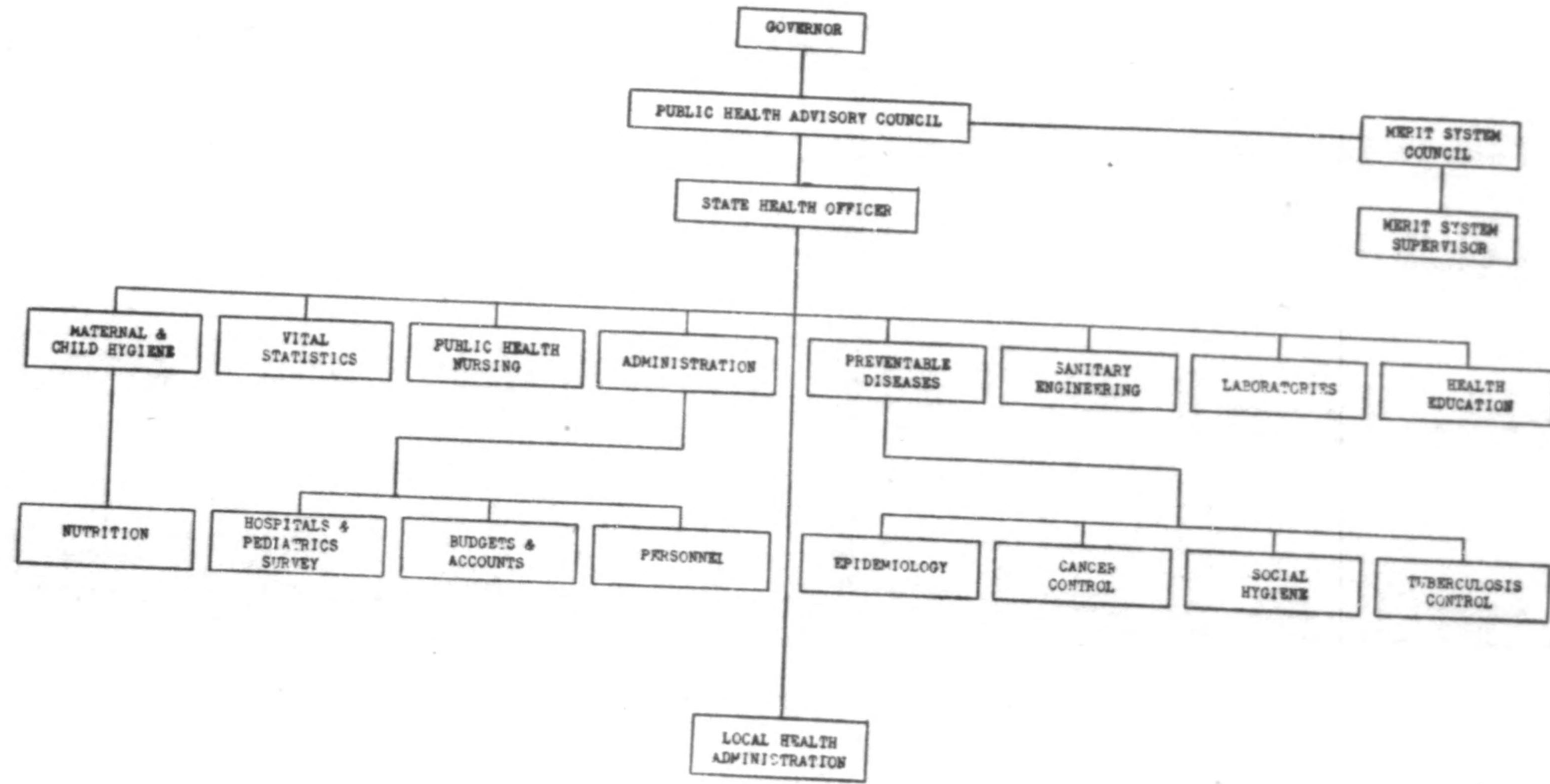
THE PUBLIC HEALTH ADVISORY COUNCIL

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DIVISION OF ADMINISTRATION

DIVISION OF ADMINISTRATION

Figure 1
ORGANIZATION OF THE STATE DEPARTMENT, 1946-1947
ORGANIZATION OF THE STATE DEPARTMENT OF HEALTH, 1946-1947



DIVISION OF ADMINISTRATION

Effective control of public health is always important, but it is of even greater necessity during years of shifting population, long working hours, overcrowding. However, during the 1944-1946 biennium North Dakota maintained her enviable position among healthiest states in the Union.

Despite loss of personnel to the armed forces and other governmental agencies and the impossibility of their replacement, work of the State Department of Health continued to be broad and comprehensive.

Health conditions were, in general, very satisfactory. The birth rate of 25.9 in 1944 remained the same in 1945. Maternal and infant death rates, which are a good index of public health, continued their long downward trend. Each reached a new low during the biennium. In 1945 the rates were 1.1 and 30.7 per 1,000 live births respectively.

The crude death rate of 9.8 per 1,000 population in 1945 was slightly higher than in 1944. Age specific death rates show that by far the greatest proportion of deaths were in the older age groups and the leading causes of death were the degenerative diseases, which most often attack old people, viz., heart disease, cancer, cerebral hemorrhage and nephritis. It is apparent from the extremely low death rates for communicable diseases that a change in emphasis from the control of these diseases must be made to the control of those diseases that attack the older group. This does not mean that the control of communicable diseases will be neglected, but the change in emphasis will be similar to that made in the early 1920s from environmental sanitation to communicable diseases.

Tuberculosis death rates reached a record low of 16.1 per 100,000 population in 1944. Deaths from pneumonia and influenza proved to be much below those of the national average for this period. Statistics on registrants for the first draft in World War II also indicated that North Dakotans are healthier than the nation as a whole. Whereas, about half of the national registrants were unfit for military service approximately one third of North Dakota registrants were unfit.

One of the major activities of the department was the control of tuberculosis. The long contemplated and planned for mass survey program was launched April 15, 1946. The initial survey was done on the State Capitol employees, the Honorable Governor, Fred Aandahl, being Number One Man in the line-up. The next groups to be surveyed were colleges throughout the State. Plans for X-raying all citizens over 15 years of age, free of charge, are underway. It is estimated that at least 5 years will be required to complete a survey of this nature. Another step forward in the bureau of tuberculosis was the installation of a tuberculosis register. New visible files were added to facilitate this work and save time.

The bureau of venereal diseases obtained a similar register for cases. Two lay investigators were employed to do the follow-up of contact delinquent cases. The idea of using lay investigators is to be

extended also to the follow-up in investigation of contacts of tuberculosis cases in the very near future.

Laboratories of the State Department of Health continued to serve people well during 1944-45. The plasma program initiated in August, 1944 more than proved its worth. Many lives were saved as a result of the prompt use of plasma supplied by this division. The program will not only be continued but plans are now being made to supply this division a mobile laboratory furnished with centrifuge, incubator, and refrigerators to better handle blood obtained at clinics for transportation to the central laboratory in Grand Forks.

Physicians have been supplied with necessary biological and arsenicals for treatment of syphilis. Pencillin was also supplied for gonorrhea and for indigent cases of pneumonia.

Establishment of a whole blood bank and also typing for the RH factor was considered as one of its laboratory procedures. Further study will be necessary before these additional services can be provided to the public, however. Dried blood cells as a by-product of plasma were prepared by the Laboratory.

Bacteriological and chemical examinations of milk and milk products, water, sewage, and eating utensils, etc., have been carried out during the year in laboratories of the State. The biennium saw expanded general clinical and pathological services for hospitals and physicians in North Dakota. Special services to supplement the other private and hospital laboratories in the State were given.

Although the Division of Maternal and Child Hygiene was without a director on and off during the entire biennium the program continued with main emphasis on child hygiene clinics. Nutrition workers attended many of these clinics and discussed individual nutrition problems with the mothers as well as presenting to them as a group, facts and demonstrations pertinent to better understanding of familial nutrition problems.

Nursing service was in greatly increased demand during the two year period and greater emphasis was required in health teaching as well as more intensive follow-up of cases registered. The development of the Emergency Maternal and Infant Care Program for wives of enlisted men of approved classifications added to the extra work required of this Division.

Nursing services included basic programs of tuberculosis control, general communicable disease control, maternal and child hygiene, immunization, and health education. Additional services were continued both to bring information to the general public and to special groups such as home nursing and nurses' aid classes.

Activities of the Sanitation Division, although somewhat curtailed by depletion of staff during the war period continued to care for the basic needs of North Dakotans. Restaurants and food handling establishments were checked, fluid milk supplies were inspected, supervisory assistance was given to both the individual and the community in securing safe water supplies and proper disposal of garbage and other wastes. With the

return of personnel early in 1946 the Division occupied itself with the great back log of inspections of sewage and waterworks plans, milk plants, and the like. The Division laid plans for the volumes of work which will come with the development of the Garrison dam project.

The Division of Health Education in addition to its routine activities connected with the distribution of pamphlet literature, visual aids and the like, completed several special projects. The initiation of the quarterly bulletin of the Department called "North Dakota Health News" was made during this period. A moving picture depicting the tuberculosis program in North Dakota was photographed. As in 1942, the health education service edited the biennial report of each division of the Department and combined the material into the biennial report of 1944.

Late in the biennium a new activity was added to the departmental list. As a means of obtaining factual information upon which an analysis can be made of hospital needs, the State Department of Health is conducting a survey of all existing hospitals and maternity homes. This is being carried on in cooperation with the Commission on Hospital Care. When completed it will provide the basis for evaluating the needs and determining the priority of need within North Dakota.

In connection with this survey and in cooperation with the American Academy of Pediatrics and the Child-Health Subcommittee of the State Health Planning Committee, the State Department of Health is carrying out a similar survey covering facilities provided in hospitals for the care of children, the services which all physicians and dentists render children and an analysis of the health services being provided children by both official agencies and other organizations.

In 1945 six counties in the southwestern part of the State banded together to obtain fulltime public health services for their citizens. These counties were Adams, Bowman, Billings, Golden Valley, Hettinger, and Slope. The Board chose New England as the health unit headquarters.

Renville County was accepted by the Board of Health of the First District Health Unit as an additional member of the health unit, making a total of four counties in all; Burke, Ward, McLean, and Renville.

The district health departments adopted the record keeping systems used by the State Department of Health for both tuberculosis and venereal disease.

In order to further protect the health of the public in North Dakota and operate most efficiently, the following recommendations are made for the future:

RECOMMENDATIONS

1. Increased appropriations to insure the salaries of the personnel and to assist in the establishment of District Health Units.
2. A separate building to be built on the Capitol grounds to house not only the Health Department but also Public Welfare, Laboratories and other departments related to public health. This building might also be available to voluntary health agencies, such as the National Red Cross, North Dakota Anti-Tuberculosis Associations, and the Infantile Paralysis Organizations.

3. Prenatal serological examination law should be enacted for the State.
4. When personnel permits there should be established the following divisions: (a) hospital relations; (b) geriatrics; (c) district health administration; (d) dental hygiene.
5. With the establishment of the Medical Center at the University of North Dakota and its proposed four year medical school, a closer tie-up with the University should be effected. This will benefit both the Medical Center and the State Department of Health.
6. Improved indexing system for vital statistics records.
7. In view of overlapping of functions of various departments with those of the State Department of Health, lines of demarcation should be drawn by legal enactments.

LOCAL HEALTH SERVICES

Today there are ten counties and the City of Fargo which have the services of a fulltime health department. The First District Health Unit covers the counties of Burke, Ward, McLean, and Renville. Six counties in the Southwestern District are Adams, Billings, Bowman, Golden Valley, Hettinger and Slope.

The health unit program includes activities in the field of vital statistics, preventable disease, maternal and child hygiene, public health nursing, sanitary engineering, laboratory service and health education.

Child health conferences have been conducted so that each area is served at least once a year. Immunization clinics were held in specific areas. In the First District the school health program was arranged so that all athletic squads are examined each year. After preliminary screening by the teachers and nurses, those children showing deviation from the normal are scheduled for examination to which parents are invited.

In the Southwestern District all rural school children in Billings county were examined by the district health officer. High school students and those in the first grade (totaling 780) in Golden Valley, Hettinger, and Billings counties were examined.

In the control of communicable disease much work was done in the field of tuberculosis and venereal disease control. Patch testing in the schools is an important part of the first mentioned program.

Environmental sanitation is a major problem in rural health. This includes the supervision of water supplies, sewage disposal, milk and food establishments, swimming pools, schools and nuisances which may affect public health.

Activity of the public health nurse is a vital part of the health program. It includes communicable disease control, maternity and infant health supervision, health education, work with schools, etc.

In addition many public meetings were furnished with speakers from the district staffs. Classes in public health were conducted for student nurses. Motion pictures on health and allied subjects were shown, and radio talks given. Through these media, and through the newspapers, health education activities have been conducted.

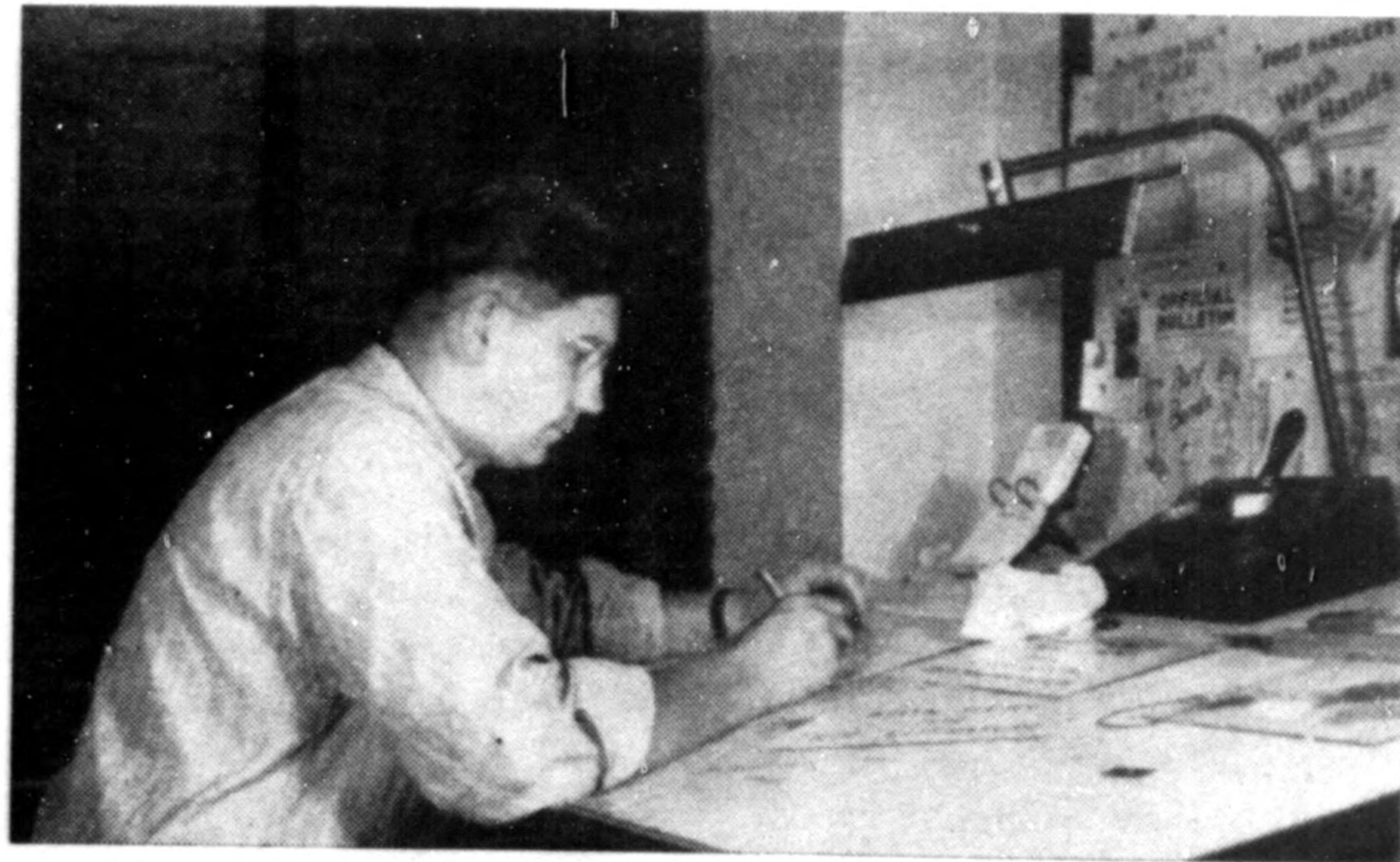
DIVISION OF HEALTH EDUCATION

DIVISION OF HEALTH EDUCATION

Health education is a continuing and well balanced educational program which has for its goal the improvement of human living. It is an integral part of the school curriculum and of the day by day life in any community. Its general aims are to instruct the people of the community—men, women, and children—in matters of personal hygiene, to keep them informed about specific health problems, and to create an understanding public support for the community health program and the agencies concerned with its administration.

No one individual or division can satisfy the educational need for such a program. In the State Department of Health these needs are met by staff from the various divisions with activities coordinated by the division of health education.

Whether health information is intended for a specific group or is general in scope, the tools at the disposal of the educator are the same. They include the spoken word, printed matter, exhibits, motion pictures, slides, and the radio.



Art is the basis for visual education.

At the present time the most commonly used tools are visual. During the biennium thirty-one new films were purchased for the film library which now includes 155 reels. Of the 52 film strips in the library, nine were added during this period. Table 1 indicates the increased use of this aid. Although the average attendance per showing dropped from last biennium, a steady rise in the number of showings and audience attendance more than balances the picture.

TABLE 1

A Comparison of Film Usage in North Dakota—1942-44 and 1944-46

	Film Showing	Audience	Average Audience Per Showing
1942-44	1256	94,652	75
1944-46	2953	203,376	69

A special project carried out in connection with visual education was the photographing of actual scenes from the mass tuberculosis x-ray survey begun in 1946. These will be used in a film depicting the fight on tuberculosis in North Dakota.

In addition to the exhibits constructed by the staff, several were borrowed from the American Medical Association and the Children's Bureau for use at annual meetings of various state organizations.



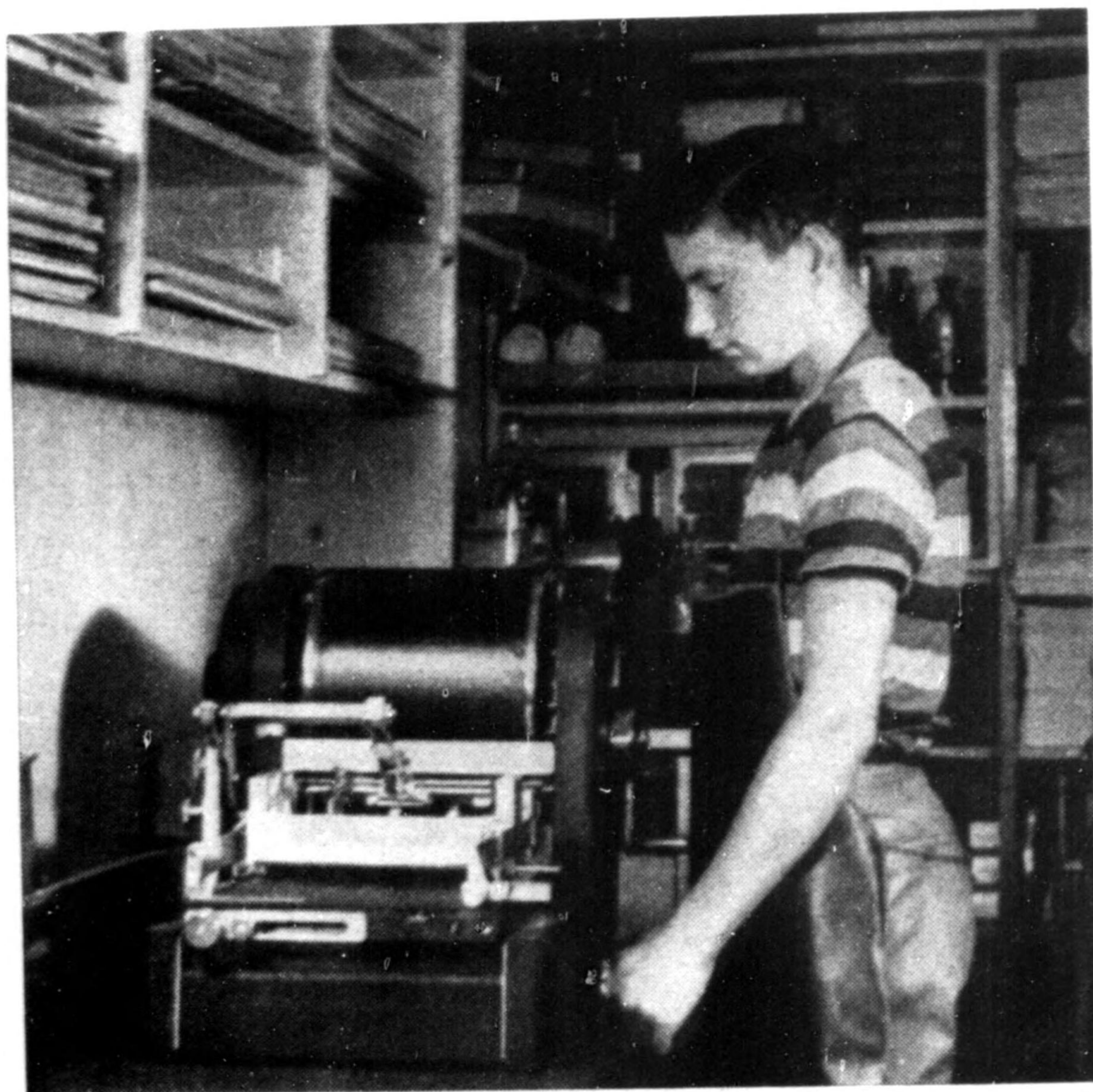
Exhibits are constructed for public use.

Editorial activities during the biennium fell into the following categories: editing and writing service which included preparation of news releases, educational reports, clearance of papers and reports, revising rules and regulations, and popular pamphlets.

Approximately 93 articles were published covering dental health, nutrition, communicable disease control, sanitation, education, statistical reports, nursing care, legislation, etc. These releases were sent to 114

papers in the state. In addition, special articles were compiled for teachers bulletins published in the First District Health Unit area.

From 1944-1946 eight bulletins were prepared and printed by this division. These included the biennial report for 1942-1944, film catalogue, Public Health Association News Letter, North Dakota Health News, Full-time Health Service report and others.



Printing health literature is an important function of the division.

The library which is a source of information for both the staff of the department and individuals of the state now contains about 1600 volumes. Of this number 268 were purchased and prepared for library use since 1944. Much of the material in the library is used in connection with requests for information to the department on subjects for which there is no pamphlet material for distribution.



A library of material on health is available to North Dakotans.

After a lapse of 23 years publication of a departmental bulletin designed for public education was resumed. "North Dakota Health News", like the old State Department of Health Bulletin was planned as a quarterly release.

Assistance was given to local health units, schools and teachers colleges in conducting institutes, workshops, etc., to train teachers to carry on school and community health projects.

Considerable time was given to improving school health educational programs. Liaison activities included consultation on programs for specialized school groups, educational committees on a local and state level, and state planning organizations. The division provided speakers, exhibits, educational bulletins, and assisted in the preparation of curriculum plans for some of the smaller schools.

Most time consuming of all tasks were the various lay and professional organizational and committee meetings. However, this was time well spent, as in the realm of education the person to person contact is the most valuable of all methods.

STATISTICAL SUMMARY OF ACTIVITIES

Films Previewed	20
Films Shown in State	2,953
Attendance at	203,276
Films purchased	31
Film strips and records purchased	9
Slides prepared	25
Exhibits (major) prepared	10
Major exhibits rented	4
Small poster exhibits	15
Newspaper releases	93
Pamphlets distributed	54,968
Publications prepared and printed	8
Assistance with curriculum planning	3
Workshops	2
Talks and lectures	35
Lay meetings	53
Special professional meetings attended	5
Volumes in library	1,602
Purchased this biennium	268
Materials added to department:	
Storage cabinet	1
Fan cooled slide projector	1
Bolex 16 mm camera	1
Blackout curtains	2

DIVISION OF PUBLIC HEALTH LABORATORIES

PUBLIC HEALTH LABORATORIES

Public Health Laboratory, University of North Dakota, Grand Forks

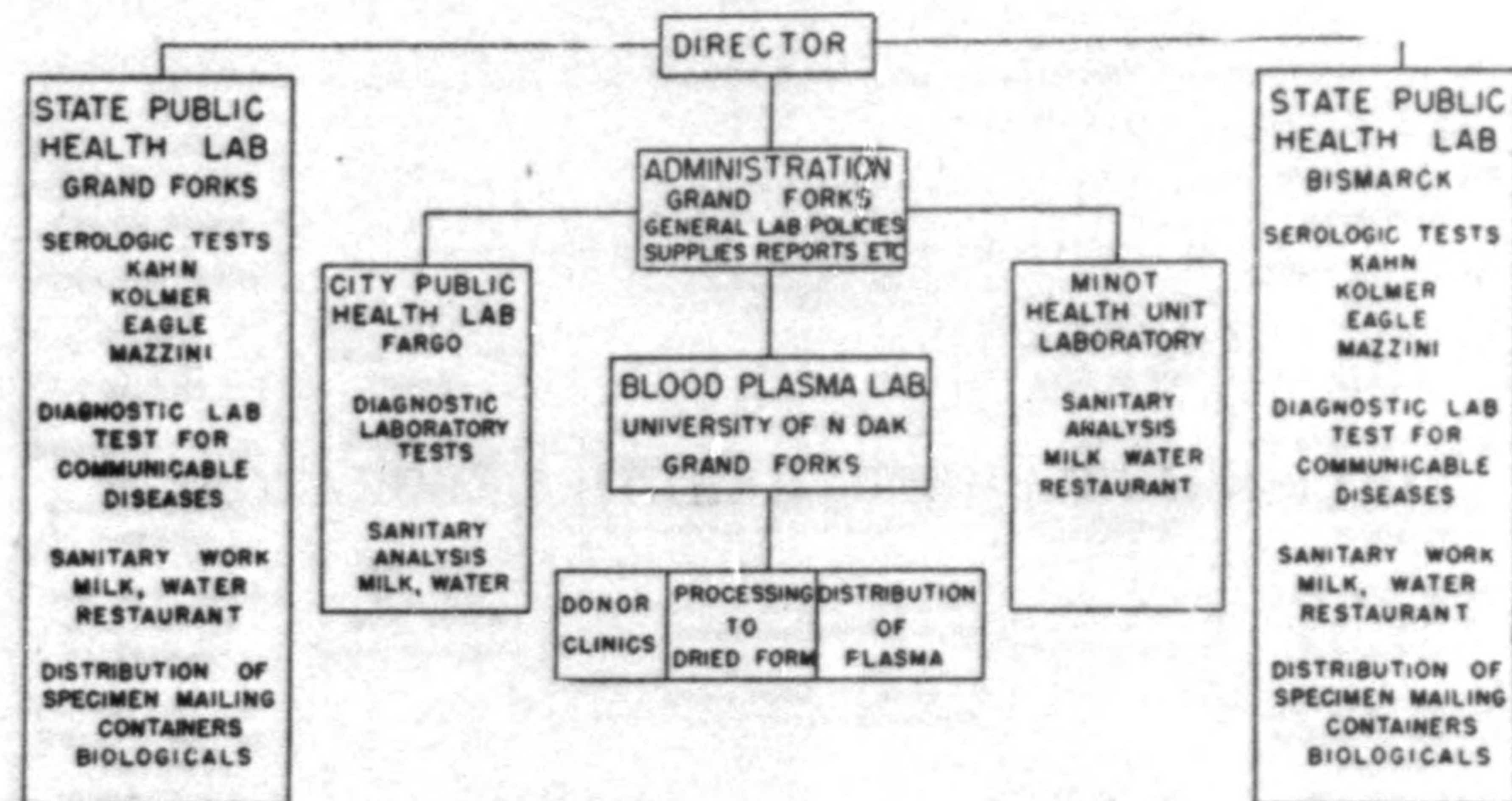
Public Health Laboratory, 415 Avenue A, Bismarck

Blood Plasma Laboratory, University of North Dakota, Grand Forks

*City Public Health Laboratory, Fargo

*Health Unit Public Health Laboratory, Burke-Ward-McLean Health Unit, Minot

Figure 2



*Not part of the Division of Laboratories, State Health Department; however, under general supervision of the Director

INTRODUCTION

The functions of any state public health laboratory are fairly well-established; however, important changes have occurred, are occurring, and must continue to occur in the place of the laboratory in public health. The service of a public health laboratory for the bacteriologic or serologic diagnosis of cases of communicable diseases and for the control of municipal milk and water supplies is an essential part of an efficient public health program. Laboratory aids to diagnosis and treatment have been formulated as the investigations of medical science have progressed, thereby giving more aid to the physician in his practice of medicine.

In North Dakota, the public health laboratories have been aware of the changes necessary to increase their usefulness and have advanced on a sound and practical basis to reach a new high level of efficiency.



Milk samples are examined for bacterial content.

Probably the outstanding achievement during the biennium was successful operation of the state-wide blood plasma service. The program, which is discussed later, definitely proved that such a service can be

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handled by a health department. The success of the program has attracted wide-spread interest throughout the country.

The work load in the Division continued to be heavy during the biennium from July 1, 1944 to June 30, 1946. As will be noted in the following report, certain phases of laboratory work show an increase with reasonable assurance that the laboratory load will continue to increase.

VOLUME OF WORK

During the biennial period from July 1, 1944 to June 30, 1946 the public health laboratories performed a total of 211,901 tests on specimens submitted for examination. As noted in Table 2, the Bismarck laboratory performed 99,379 tests while the Grand Forks laboratory performed 112,522 tests. Table 3 also shows that there was a total of 149,152 tests

TABLE 2

Total Number of Laboratory Tests Performed on Specimens Submitted to the Division of Laboratories July 1, 1944—June 30, 1946

Type of Laboratory Examination	Bismarck Laboratory	Grand Forks Laboratory	Total
Venereal Diseases			
Syphilis:			
Serologic Tests	66,912	78,074	144,986
Colloidal Gold	158	82	240
Gonorrhoea:	2,610	1,316	3,926
Communicable Diseases			
Agglutination tests, Cultures, smears, etc.:	9,595	24,387	33,982
Sanitary Tests			
Milk, water, food, etc.	20,104	8,663	28,767
TOTAL	99,379	112,522	211,901

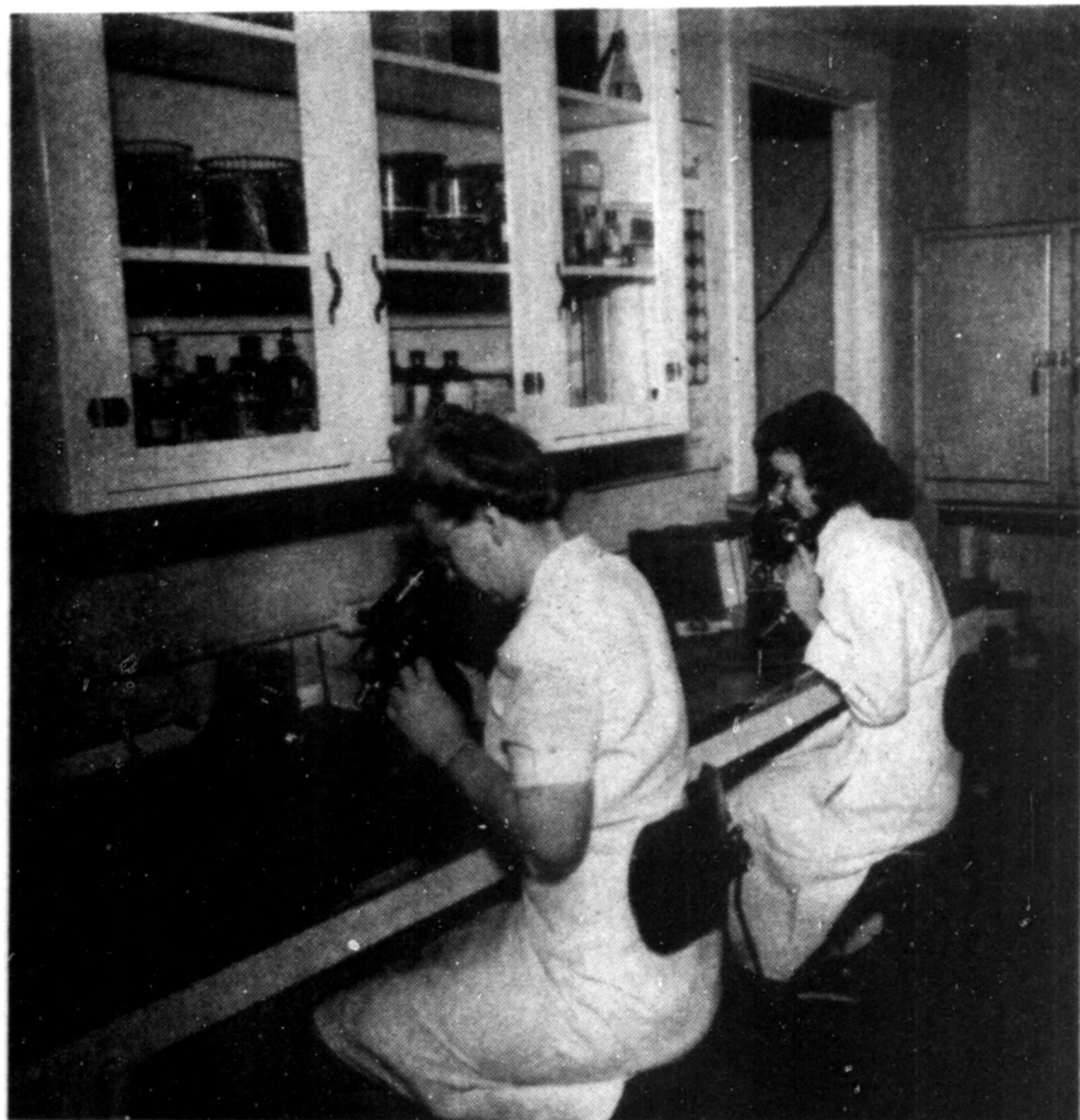
performed for evidence of venereal diseases, 33,982 tests performed on specimens submitted for evidence of communicable diseases, and 28,767 sanitary tests. During this period there was a decrease in the number of serologic tests for syphilis as compared to the number run in the previous biennium; the reason for this is that there were no specimens examined under the Selective Service Act. There was a definite increase in the other types of laboratory work done during this biennial period over any previous biennium.



Each specimen received in laboratory is given a number and entered in record book before being examined.

Table 3 shows the number of tests run on specimens submitted for the diagnosis of venereal diseases. As noted, a total of 149,152 tests was run; 145,226 of these were serologic tests for syphilis. Sixty-seven thousand seventy serologic tests were run by the Bismarck laboratory and 78,156 by the Grand Forks laboratory. A total of 3,926 tests was performed on specimens submitted for the diagnosis of gonorrhoea. This number is an increase of 1,266, or 32.0 percent, over specimens submitted during the previous biennial period.

Table 4 shows a classification of the specimens submitted to the laboratories for syphilis serology. A total of 76,978 blood specimens was examined during the biennial period. Of this total, 34,904 were received and examined in the Bismarck laboratory and 42,074 in the Grand Forks laboratory. The total number of specimens examined in the laboratories was lower this biennium than in the previous two year period because no specimens were submitted under the Selective Service Act. However, there was an increase in the number of specimens submitted for routine diagnosis, premarital, and prenatal examination.



Microscopic examination of specimens is important laboratory function.

During this biennial period there was an increase of 25 percent in the number of specimens submitted under the North Dakota premarital law; 16,841 specimens were examined as compared to the previous two year total of 12,813. Seven thousand, nine hundred and six specimens were submitted for prenatal examination. This number represents approximately a fifty percent increase over any other period; however, many more specimens should be submitted in this particular classification. The group called "blood donors" consists of specimens collected at the volunteer blood donor clinics conducted in connection with the state-wide blood plasma program.

Table 3
Total Tests on Specimens Submitted for Venereal Diseases
July 1, 1944—June 30, 1946

Type of Test	Bismarck Laboratory	Grand Forks Laboratory	Total
Syphilis:			
1. Blood Serum			
Kahn Precipitation	34,421	41,304	75,725
Kolmer Comp.-Fixation	31,415	36,145	67,660
Mazzini	672	168	840
Eagle Flocculation	32	44	76
2. Spinal Fluids			
Kolmer Comp.-Fixation	372	413	785
Colloidal Gold	158	82	240
TOTAL	67,070	78,156	145,226
Gonorrhea:			
Microscopic Examinations	2,162	1,258	3,420
Cultures	448	58	506
TOTAL	2,610	1,316	3,926
GRAND TOTAL	69,680	79,472	149,152

TABLE 4
Classification of Specimens Submitted for Syphilis Serology
July 1, 1944—June 30, 1946

Specimen submitted for:	Bismarck Laboratory	Grand Forks Laboratory	Total
Routine Diagnosis*	20,949	27,610	48,559
Premarital*	9,493	7,348	16,841
Prenatal*	4,192	3,714	7,906
Blood Donors	38	3,149	3,187
Evaluation*	232	253	485
TOTAL	34,904	42,074	76,978

*Each specimen examined routinely by the Kahn and Kolmer Tests.

Table 5 is of particular interest, as it shows the relationship of diagnostic tests for venereal disease to the remainder of examinations performed in the laboratory. It will be noted that venereal disease tests constituted 70.32 percent of all the tests performed in the Division, both laboratories performing approximately the same percentage of venereal

As noted in the table, 86.43 percent of all examinations were of the diagnostic type, with 13.57 percent of the sanitary type. It is interesting to note the difference between the two public health laboratories—20.23 percent of the examinations in the Bismarck laboratory were of the sanitary type, while only 7.69 percent were of this type in the Grand Forks laboratory.

Table 8 groups together the miscellaneous activities of the Division. This table shows the number of specimen mailing containers sent out, the number of biological packages mailed out, and the approximate amount of media prepared and used during the biennial period.

A total of 97,551 specimen mailing containers was made up and sent out to physicians for their convenience in submitting specimens for examination. Proper laboratory results are dependent to a large extent on the receipt of suitable specimens received in good condition. Much time and effort has been expended in an effort to provide outfits designed so that

TABLE 6
Summary of Sanitary Work Performed on Samples
Submitted to the Division of Laboratories
July 1, 1944—June 30, 1946

Type of Test	Bismarck Laboratory	Grand Forks Laboratory	Total
Milk and Cream:			
Standard Plate Count	3,074	1,498	4,572
Direct Microscopic Exam.	1,949	59	2,008
Phosphatase Test	809	726	1,535
Percentage Butterfat	1,579	527	2,106
Sediment	1,703		1,703
Coliform Test	903	887	1,790
Specific Gravity	213		213
TOTAL	10,230	3,697	13,927
Water:			
Standard Plate Count	66	397	463
Coli-Aerogenes Group	4,171	2,624	6,795
TOTAL	4,237	3,021	7,258
Sanitary Swab Tests:			
Bacterial Plate Count	4,220	947	5,167
Coli-Aerogenes Group	1,417	998	2,415
TOTAL	5,637	1,945	7,582
GRAND TOTAL	20,104	8,663	28,767

TABLE 7
Diagnostic Tests Performed in the Laboratories as Compared to Sanitary Tests*
July 1, 1944—June 30, 1946

Laboratory	Total Tests Performed on Specimens Submitted	Diagnostic Per Cent of Total Tests	Sanitary Tests*	Per Cent of Total
Bismarck	99,379	79.77	20,104	20.23
Grand Forks	112,522	103,859	8,663	7.69
Total	211,901	183,134	28,767	13.57

*Includes milk, water, and sanitary (swab) tests.

disease work. Seventy and 20 hundredths percent is approximately seven percent less than the percentage recorded in the previous biennial period.

During this biennial period the laboratories were called upon to examine 8,210 cultures for the presence of diphtheria bacilli, a sharp increase in this type of specimen over those received in any previous period. A large number of these cultures was submitted from the First District Health Unit in Minot, where there were a number of diphtheria cases.

The bacteriologic diagnosis of diphtheria is one of the most difficult microscopic examinations the laboratory has to perform. The reason for this is that there are so many different types, involution forms, diphtheroids, which are not readily identified. Also, laboratory technicians do not have an opportunity to examine as many cultures now as they might have ten years ago. With experience, the technician can identify and safely differentiate *C. diphtheriae* from the diphtheroid bacillus; however, guinea pig virulence tests are sometimes required and are indicated when typical morphologic diphtheria bacilli are found in contact cases.

There has been an increase in the amount of laboratory work other than the serologic tests. This is significant because the amount of time spent by the laboratory staff in performing this thirty percent of the total volume of work is very great. Diagnostic work includes much preparation on the part of the staff with regard to culture media, reagents, etc., in order that the tests can be performed in an efficient and satisfactory manner. Bacteriologic procedures are technical and have to be performed according to certain standards. The most reliable results to some of these tests are difficult to obtain and much time has to be spent on them before the final result can be determined.

Table 6 is a summary of the laboratory tests performed on sanitary samples submitted to the laboratories. A total of 28,767 tests was performed during the biennial period—this is an increase of 10,173 tests, or 35.36 percent, over the previous biennial period. Of the total volume of sanitary analyses, the Bismarck laboratory did 20,104 and the Grand Forks laboratory 8,663. A total of 13,927 tests was performed on milk samples. This table also shows that 7,258 bacteriologic tests were performed on water samples submitted from privately owned wells and municipal water supplies. The 7,582 tests performed on sanitary swabs submitted are discussed more fully under "Special Activities."

Table 7 shows the number of diagnostic tests performed in the laboratories as compared to sanitary tests. The diagnostic group includes blood specimens for syphilis, bacteriologic cultures, smears for microscopic examination, agglutination tests, etc.; the sanitary group includes bacteriologic tests performed on milk and water samples and swab specimens from restaurant inspections.

TABLE 5
The Relationship of Diagnostic Tests for Venereal Diseases to the Rest of the Examinations made in the Division of Laboratories
July 1, 1944—June 30, 1946

Laboratory	Total Exams.	Venereal Disease Tests					Other Tests			
		Serologic Tests Blood Spec.	Kolmer Sp. Fluid	Gon-orrhoea	Total	% of Total Exams.	Sani-tary*	Misc. xx	Total	% of Total Exams.
Bismarck	99,379	66,540	372	2,610	69,522	69.85	20,104	9,753	29,857	30.15
Grand Forks	112,522	77,659	413	1,316	79,388	70.56	8,663	24,471	33,134	29.44
TOTAL	211,901	144,199	785	3,926	148,910	70.32	28,767	34,224	62,891	29.68

*Includes milk, water, and restaurant swab tests.

xx Includes communicable disease specimens, agglutinations, isolations, etc.

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As noted in the table, 86.43 percent of all examinations were of the diagnostic type, with 13.57 percent of the sanitary type. It is interesting to note the difference between the two public health laboratories—20.23 percent of the examinations in the Bismarck laboratory were of the sanitary type, while only 7.69 percent were of this type in the Grand Forks laboratory.

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Sanitary Swab Tests:			
Bacterial Plate Count	4,220	947	5,167
Coli-Aerogenes Group	1,417	998	2,415
TOTAL	5,637	1,945	7,582
GRAND TOTAL	20,104	8,663	28,767

TABLE 7
Diagnostic Tests Performed in the Laboratories as Compared to Sanitary Tests*
July 1, 1944—June 30, 1946

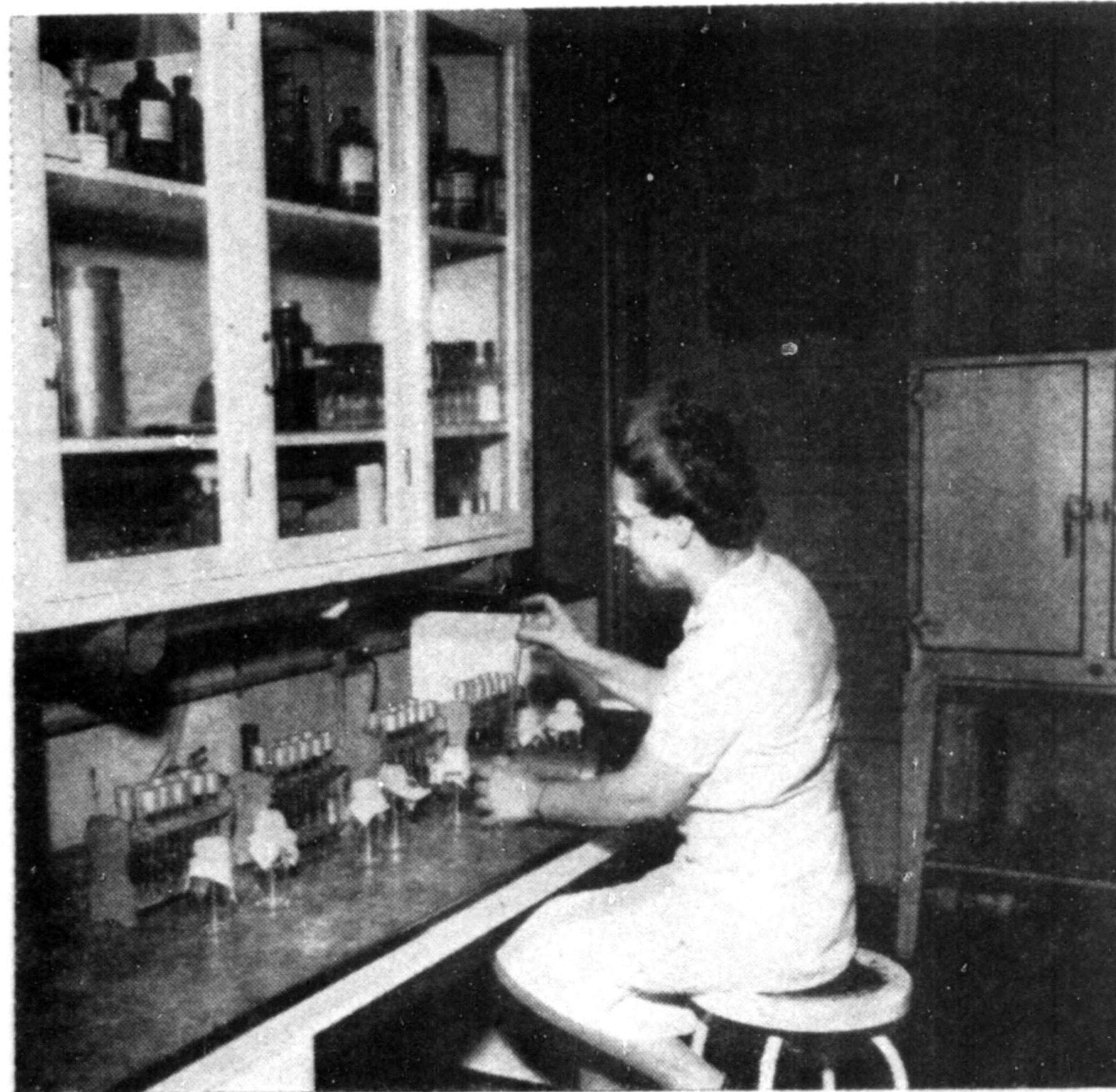
Laboratory	Total Tests Performed on Specimens Submitted	Diagnostic Tests	Per Cent of Total	Sanitary Tests*	Per Cent of Total
Bismarck	99,379	79,275	79.77	20,104	20.23
Grand Forks	112,522	103,859	92.31	8,663	7.69
Total	211,901	183,134	86.43	28,767	13.57

*Includes milk, water, and sanitary (swab) tests.

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Grand Forks	112,522	103,859	92.31	8,663	7.69
Total	211,901	183,134	86.43	28,767	13.57

*Includes milk, water, and sanitary (swab) tests.



Samples of water for drinking purposes are received for bacteriological analysis. Samples are cultured for isolation and identification of the coliform group organisms.

specimens will reach the laboratories in the best possible condition. The use of the right type of mailing container insures the proper handling of specimens when they are received in the laboratories, especially if they are received after working hours.

During the biennial period 4,049 packages of biologicals were sent out to physicians and/or hospitals. These materials are only sent out upon requests from physicians in the state.

The preparation of culture media is an important function of the laboratories. As noted in Table 8, a total of 1,535 liters of media was prepared for use in the examination of specimens. The preparation of media and reagents, a time-consuming but important phase of laboratory work, is done by the technical staff.

PUBLIC HEALTH LABORATORY SERVICES

In response to the wishes of physicians and citizens for more information on the laboratory services offered in the state a pamphlet containing such information was prepared. It covers the services offered by the laboratories, postal regulations governing specimen mailing containers, biologics distributed by the laboratories, and pertinent facts on how to submit a good laboratory specimen. This pamphlet also has pictures illustrating equipment and activities of the Division.

The functions of a state public health laboratory are fairly well established. The services offered in North Dakota are comparable with those of any other state.

TABLE 8
Miscellaneous Laboratory Activities
July 1, 1944—June 30, 1946

Activity	Bismarck Laboratory	Grand Forks Laboratory	Total
Mailing Containers Sent Out*	42,282	55,269	97,551
Biological Packages Sent Out*	3,030	1,019	4,049
Media Prepared For Laboratory (Liters)	965	570	1,535
TOTAL	46,277	56,758	103,035

*Sent out upon request of physicians in North Dakota.

ROUTINE LABORATORY SERVICES OFFERED PHYSICIANS

Disease	Specimen	Examination
1. Amebiasis	Warm feces	Saline and stained preparation for trophozoites and cysts
	Feces in preservative	Culture Examination for cysts
2. Anaerobic infection	Pus	Anaerobic culture Animal inoculation
3. Bacillary dysentery	Feces	Culture isolation and identification of organisms
4. Diphtheria and carrier state	Throat swab Nose swab Ear swab	Direct microscopic examination Culture Virulence tests
5. Encephalitis	Spinal Fluid	Microscopic examination Sugar and globulin Colloidal gold Culture
	Blood	Neutralization (sent away)
6. Gonorrheal infection	Slide preparation Material (exudate) for culture	Stained for gram-negative intracellular diplococci Culture, isolation of organism
7. Infectious Mononucleosis (glandular fever)	Blood	Agglutination test (heterophile antibody)

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Disease	Specimen	Examination
8. Intestinal parasites	Feces	Wet preparation Flotation or other special methods for ova Stained preparation for cysts
9. Malaria	Blood film	Stained for parasites
10. Meningitis	Spinal fluid	Microscopic Examination Culture for isolation of organisms Globulin reaction Qualitative sugar Colloidal gold or colloidal mastic test
	Nasopharynx swab	Culture for determination of carrier state Diagnostic "quellung" test; culture
a. Influenzal	Spinal fluid	
11. Pertussis (whooping cough)	Spray from cough on cough plate	Culture for B. pertussis
12. Pneumonia due to the pneumococcus and other organisms	Blood Sputum Pleural fluid Spinal fluid Eye Swab	Culture Type determinations Neufeld "Quellung" reaction Mouse inoculation
13. Poliomyelitis	Spinal fluid	Microscopic examination Qualitative sugar determination Globulin reaction Colloidal gold
14. Rabies	Animal head	Stained slide for Negri bodies Animal inoculation
15. Scarlet fever and septic sore throat	Throat swab	Culture for hemolytic streptococci
16. Septicemia	Blood	Culture
17. Syphilis	Blood serum Spinal fluid Exudate from lesion	Kahn precipitation test Kolmer complement-fixation test Kolmer complement-fixation test Lange's colloidal gold Darkfield
18. Tuberculosis	Sputum Gastric washings Urine Pleural fluid Spinal fluid Pus Feces	Microscopic examination Culture Animal inoculation
19. Tularemia	Blood serum Pus	Agglutination test Animal inoculation
20. Typhoid Fever and carrier state	Blood serum Blood Feces Bile Urine	Agglutination test Culture, isolation and identification of organisms
21. Undulant fever	Blood serum Blood (citrated)	Agglutination test Culture
22. Vincent's infection	Slide preparation	Stained for organisms
23. Food poisoning	Suspected food	Culture, isolation and identification of organisms Animal inoculation (Botulism)
24. Sanitary	Milk Water Swabs	Bacteriologic and chemical Bacteriologic and chemical Bacteriologic

SANITARY WORK

As pointed out earlier in this report, the laboratories performed a total of 28,767 tests on samples coming under the general category of sanitary work. This phase of laboratory work is very important to the public health since through a knowledge of the inspection of milk and water supplies and restaurants the people of the state can have some sense of security insofar as the transmission of communicable diseases is concerned. The bacteriologic examination plays an important role in the grading and checking of these everyday commodities. This important phase of public health activity can be controlled only through a coordinated program between the Divisions of Laboratories and Engineering.

The laboratories can look forward to an increase in the type of laboratory work for the following reasons:



Milk samples for grading purposes are submitted for bacteriological examination.

1. Return to the Health Department of Sanitary Engineers from the armed forces.
2. An expanding sanitary program of the Division of Engineering, which now employs sanitarians for inspection purposes.
3. Expanding restaurant sanitary inspection program.
4. Public demand for approved water and milk supplies and grading of restaurants.

The field of restaurant sanitation is one which is receiving much attention during this post-war period. In the past year North Dakota has been very active in "swab testing" as a means of determining the proper sanitizing of eating and drinking utensils.

In May 1946 standard laboratory procedures for the examination of water, milk, and swab tests were added to the laboratory manual. These standards have been adopted by the City Laboratory of Fargo and the laboratory of the First District Health Unit in Minot and will mean that results of these laboratory tests will be comparable over the entire state as the same procedure will be followed by each laboratory doing this type of work.

SEROLOGIC EVALUATION STUDY

Evaluation studies on the efficiency of serologic tests for syphilis as performed by the state health department laboratories have been carried on each year since 1936. The purpose of these studies is to improve and standardize the performance of serologic tests for syphilis in all laboratories so that uniform results may be obtained. This study is conducted annually by the U. S. Public Health Service through the Venereal Disease Research Laboratory at Staten Island, New York.

Inasmuch as the medical profession places major reliance in the diagnosis of syphilis on laboratory tests, it is important that these tests be as efficient as possible. These evaluation studies tend to serve as a system of gauging the efficiency of performance of serologic tests.

The Grand Forks laboratory was entered in the 1945 study. As in past years, the specimens received from the U. S. Public Health Service were examined by our routine procedures, the Standard Kahn Test and the Simplified Kolmer Complement-Fixation test. Results of the 1945 study rated the Grand Forks laboratory as proficient in both serologic procedures used.

The Bismarck laboratory was entered in the 1946 evaluation study.

SPECIAL TRAINING

Laboratory diagnosis of venereal diseases is an important part of the public health laboratory work. In order to stay abreast of modern research work in this field, and to see the practical application of new methods, special training is necessary.

One member of the staff spent three weeks during December, 1944, in the U. S. Public Health Service V. D. Research laboratory in Staten Island, N. Y. Three other members spent two weeks each in the V. D. Research Laboratory and one week in Dr. Kahn's laboratory in Ann Arbor, Michigan.

Information acquired from this type of intensive training is of much value in keeping the routine serology of the Division up to par. It is felt that the training the staff has had has played an important part in the excellent serology which is done in North Dakota.

PUBLICATIONS

The following publications emanated from the Division during this biennium.

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BLOOD PLASMA PROGRAM

Free blood plasma for civilian use is a reality in North Dakota. The State Health Department has conclusively shown during the past two years that such a program is feasible on a state-wide basis and that it can be operated economically.

In March, 1944, the North Dakota State Legislature appropriated funds to the State Health Department to set up and finance a free plasma service. These funds were augmented with money from the U. S. Public Health Service and a program was established to furnish dried blood plasma free of charge to anyone in the State needing it. North Dakota was the first state to have a dried blood plasma program and because of its success many other states have decided to give such a service to their citizens. The program embraces the procurement of blood from volunteer donors, its processing to the dried state, and the distribution of the final product on a state-wide basis.

The purpose of the program is to help save civilian lives in North Dakota. In a paper presented before the Health Officers' section of the American Public Health Association meeting in October, 1944, Dr. J. B. Alsever remarked, "It may be desirable for Public Health Laboratories to undertake serum and/or plasma center projects—the development and maintenance of plasma reserves through a free state-wide distribution program for the treatment of the sick and injured is a real challenge to

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Registration of Blood Donors is first function of clinics.

those charged with guarding the health of the nation." At the time Dr. Alsever made this remark, the North Dakota State Department of Health had already instituted its plasma program under the administration of the Division of Laboratories.

TYPE OF BLOOD PLASMA

The first problem to be decided was in what form plasma should be prepared—liquid, frozen, or dried. In processing blood full consideration must be given the characteristics of the end product. Ideally, the composition of the stored plasma should be as much like that of the freshly prepared product as possible. In thinking of a state-wide service, factors to be considered are the degree of stabilization desired, the storage facilities available, and the amount of handling or transportation anticipated. The separated plasma can be stored in the liquid state, can be frozen, or can be dried from the frozen state.

Dried plasma was the product of choice, since the dried state preserves most of the labile components of plasma. It is easily restored to the liquid state and can survive a wider range of temperature variation without denaturing or precipitating protein than any of the other types of

plasma. It can be more efficiently transported and does not require any special place for storage.

PROCESSING LABORATORIES

A completely new laboratory was set up in three rooms located in the same building with the public health laboratory at the University of North Dakota. The standard apparatus used for dehydration is that developed by Dr. Max Strumia and Dr. John S. McGraw of the Bryn Mawr (Pennsylvania) Hospital. This apparatus is capable of shell freezing and dehydrating over five thousand units of plasma per year.

A small staff is adequate to operate a program such as we have in North Dakota. The entire program is administered by the Director of Laboratories of the State Health Department, who schedules and manages the donor clinics and controls the distribution of the final product. A trained bacteriologist is in direct charge of the plasma laboratory and is responsible for all technical procedures. One nontechnical assistant in the laboratory and a dishwasher complete the staff. The Director and the bacteriologist in charge of the processing laboratory set up all clinics and assist local personnel in their operation. The local people, including the physician, furnish all other help on a volunteer basis.

BLOOD DONOR CLINICS

Blood is procured from volunteer donors only, without payment of any fee. Volunteer donors report to a regular donor clinic set up by coopera-



Typical Volunteer Blood Donor Clinic

tion between the State Health Department and the local community. Under the North Dakota program local volunteer help is used to a great extent and local physicians give their services for collecting the blood. Thus far this system has proved satisfactory.

In July, 1945, the American Red Cross announced a new policy governing the participation of Red Cross chapters in civilian blood donor services. There had been a widespread demand that the Red Cross, because of its association with the procurement of blood for the armed forces and out of the abundance of its experience, render a similar service to the civilian population. The question was carefully considered

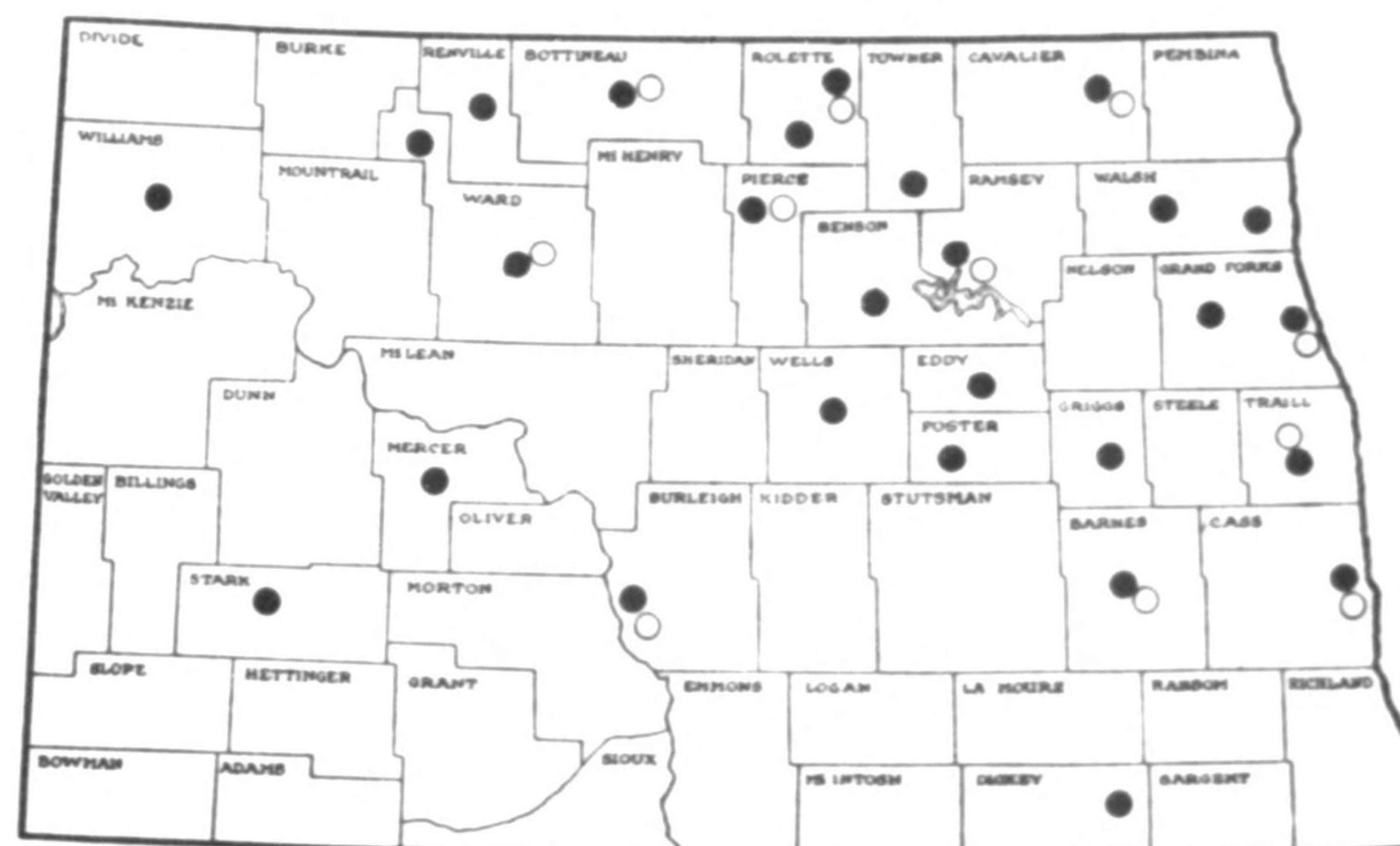


Canteen service is available for all donors following their donation.

by all parties concerned, with the result that a policy of chapter participation was finally announced. Briefly, the policy stated that chapters of the American Red Cross desiring to do so may participate in civilian blood donor services only upon the receipt of authorization from the Area Manager. Such authorization may be granted only when certain conditions are met. These conditions are quite extensive and only a few of the more important ones need be mentioned in this report, as follows:

1. That the responsibility for technical operations, staff, and equipment rests with a reliable medical or health agency.
2. That participation of the chapter is limited to the recruitment or enrollment or both, of volunteer donors and the provision of non-technical staff and equipment.
3. That the sponsoring health agency meets the minimum technical standards specified by the American Red Cross.
4. That the service is designed to serve all acceptable hospitals and clinics and all physicians licensed to practice medicine and surgery in the communities where the service is conducted.
5. That no charge is to be made to physicians, hospitals, clinics, or patients for the blood or blood derivatives produced under the program.
6. That the Red Cross is to be responsible for seeing that there is adequate publicity for donor recruitment, to acquaint the public with the purpose for which its blood is to be used.

Figure 3
BLOOD DONOR CLINICS



● First Clinics ○ Repeat Clinics
Showing distribution of 85 clinics in 28 North Dakota Communities

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North Dakota's program was given the approval of the American Red Cross and an arrangement has been made whereby local chapters in the state may cooperate with the Health Department program as an assisting agency.

Donor clinics were scheduled to meet the needs of the state, to provide a supply of plasma in all depots available for routine use, and to keep a reserve in the processing laboratory for emergencies.

Clinics are held in easily accessible public buildings, such as churches, schools, memorial buildings, hospitals, etc. Volunteer help assists in running clinics efficiently. On the appointed date the Division sends out a mobile unit, which carries all the necessary supplies for the operation of the clinic. Generally two technicians accompany the Director to assist the local people conducting the clinic.

Thus far, a total of 85 clinics has been held in 28 communities, with a total registration of 4,543 volunteer donors. Figure 3 shows the distribution of these clinics. It will be noted that a fairly representative portion of the state has been covered.

TRANSPORTATION AND PROCESSING

At the conclusion of each donor clinic all blood is transported to the public health laboratory in Grand Forks for processing. The blood samples are placed in ice chests and are either carried to the laboratory by automobile or are moved by train when connections are satisfactory. Each ice chest holds 18 samples of blood and has a removable tray holding approximately 30 pounds of ice. As soon as the blood is received in Grand Forks it is placed in a refrigerator where it is allowed to remain without being disturbed for 18 to 24 hours.

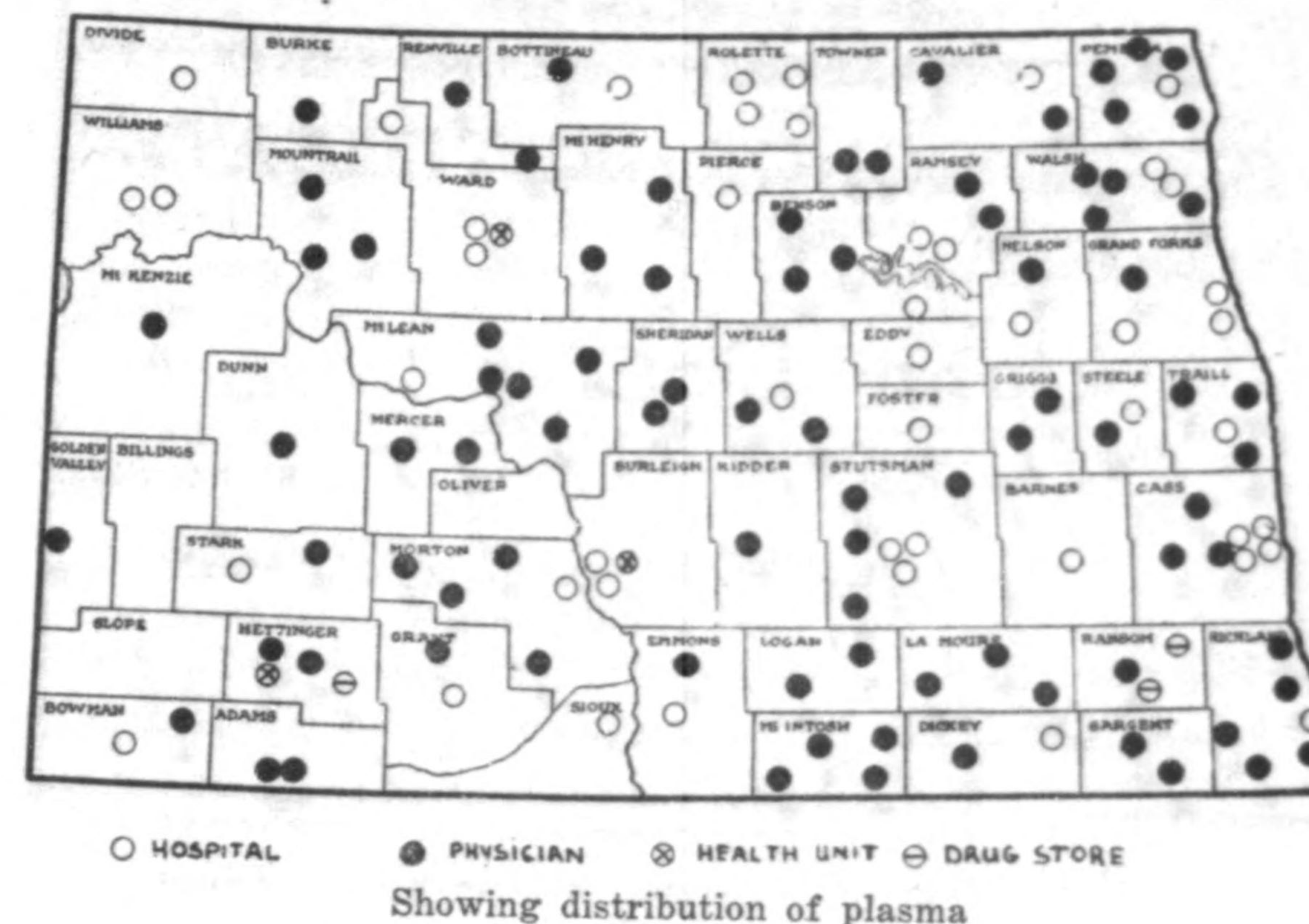
Processing the blood plasma to the dried state is done by a method which conforms to the requirements of the National Institute of Health.

DISTRIBUTION OF PLASMA

Under the North Dakota program a complete package of plasma is distributed. Each package sent out contains one bottle of dried pooled normal human plasma, one bottle of 0.1 percent citric acid solution for restoration of the plasma to the liquid state, and a complete intravenous administration set and directions for its use. This complete unit makes it possible for a physician to administer plasma in an emergency, eliminating the necessity for moving patients to a hospital. This is important in North Dakota because of farm accidents and lack of adequate hospital coverage in the state.

For a program of this type to be successful the product must be available to as many people as possible all the time. Therefore, the first objective of the program was to make supplies of plasma available in every part of the state. Figure 4 shows the distribution of plasma during the first year. Plasma supplies are located in 47 hospitals, 3 health units, 3 drug stores, and the offices of 88 private physicians, making a total

Figure 4
DISTRIBUTION OF PLASMA



Showing distribution of plasma

of 141 depots in 50 of the state's 53 counties. These depots constitute our mobile reserve which can be shipped to other communities to meet emergency needs. Such a wide distribution is important if the program is to serve its purpose—that of having plasma available to everyone.

In June 1945, the American Red Cross announced a plan whereby they would furnish dried plasma to the various states for use in the civilian practice of medicine. This material was prepared from blood collected by the Red Cross for the armed forces and later declared surplus to their needs. Supplies of this surplus plasma are provided to the State Department of Health by the American Red Cross for distribution to all physicians licensed to practice medicine and surgery and to all acceptable hospitals, to be used without charge.

The acquisition of this plasma will enable the State Health Department to: (1) supplement its own program over a period of time, which will enable us to acquire a reserve supply; (2) put on an educational program to inform physicians and laymen of the importance of plasma in the civilian practice of medicine; (3) continue the manufacture of the single unit of plasma for general distribution, and; (4) cover a larger area of the state with available plasma.

The first allotment of Red Cross plasma (1440 units) was received in January, 1946, and the second supply (1200 units) was received in April, 1946.

The Health Department will continue to operate its program as in the past. The use of the Red Cross plasma will no doubt increase the

**NORTH DAKOTA STATE
HEALTH DEPARTMENT — UNIVERSITY
BLOOD DONOR CERTIFICATE**

THIS IS TO CERTIFY THAT

John Doe

is a voluntary blood donor of the North Dakota Blood Donor service.

Melvin E. Koons
Director, Division of Laboratories

Place **Fargo** Date **4-1-46**

Card certifying donation of blood is given each donor.

future need for plasma in the state, and as soon as the surplus supply is exhausted there will be a greater demand on the part of the public that plasma services be continued. The state program will be kept active. Future plans call for the continuation of donor clinics on a smaller scale, with wider coverage of the state. These clinics will be held for educational purposes and to build up a larger reserve supply of plasma for emergency needs.

THE USE OF PLASMA

When the free plasma service was first instituted in North Dakota, there was some doubt as to how much plasma would be used by the medical profession. A preliminary survey of the use of plasma in the state showed that very little was being used and that only in the larger cities. The rural areas had used practically no plasma. Prior to the war, the medical profession at large had little opportunity for personal experience with the use of plasma—its value had not been adequately proven nor had the results of its use appeared too extensively in the literature. Then, too, the use of commercial plasma was restricted somewhat by its high cost.

The recognition of the value of human blood plasma as a therapeutic agent is one of the outstanding advances of medical science in recent years. The successful use of plasma by the Armed Forces during the war period has resulted in a wide-spread demand that this material be made available to the civilian population.

The most spectacular results of the use of plasma are seen in the treatment of traumatic and burn shock; however, the ready availability

of plasma is resulting in better preoperative preparation of surgical patients who show decreased plasma proteins. Convalescence is smoother and shorter when the blood components can be kept within the normal limits.

One of the first objectives of the blood plasma program was to get a wide distribution so that people throughout the state could benefit from the program. As is shown on Figure 5, plasma has been used rather widely within the state. Its use has not been restricted to one or two places in the state, but has been distributed over a wide area which includes 41 of the 53 counties in the state and a total of 55 different communities. This is gratifying because it does show that the use of plasma is not restricted to the urban centers, but covers rural areas also.

Table 9 shows a classification of the reports received on the plasma used thus far in the program. As noted, a total of 3,303 units has been used on 1,813 patients. Of this total, 1,556, or 47.2 percent, has been used in treating 978 patients suffering from some form of shock. Obstetrical complications accounted for 495 units, or 15 percent of the total used, and 615 units, or 18.6 percent, were used in treating 161 patients suffering from some form of hypoproteinemia. This is evidence enough to indicate that the program is a success and is helping to save lives of North Dakotans, as well as making many convalescences smoother and more rapid.

**Figure 5
USE OF PLASMA**



Showing that plasma was used in 41 of 53 counties and in 55 communities

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TABLE 9
Classification of Reports Received on the Use of Plasma
September, 1944—June 30, 1946

Condition For Which Used	No. of Patients	Percent of Total	No. of Units Used	Percent of Total
Shock	978	53.9	1556	47.2
Obstetrical	330	18.2	495	15.0
Hypoproteinemia	161	8.9	615	18.6
Burn	56	3.1	142	4.3
Hemorrhage	67	3.8	120	3.6
Infection	80	4.4	135	4.1
Communicable Disease	12	0.6	26	0.7
Miscellaneous	60	3.4	94	2.9
Not Classified	67	3.7	83	2.5
Wasted*			37	1.1
TOTAL	1813	100.0	3303	100.0

*Wasted at time of restoration, prior to administration.

COST OF THE PROGRAM

The use of plasma thus far has established the program as a definite medical aid to the people of North Dakota. Also, considered from an economic viewpoint the program has saved the people of the state many thousands of dollars.

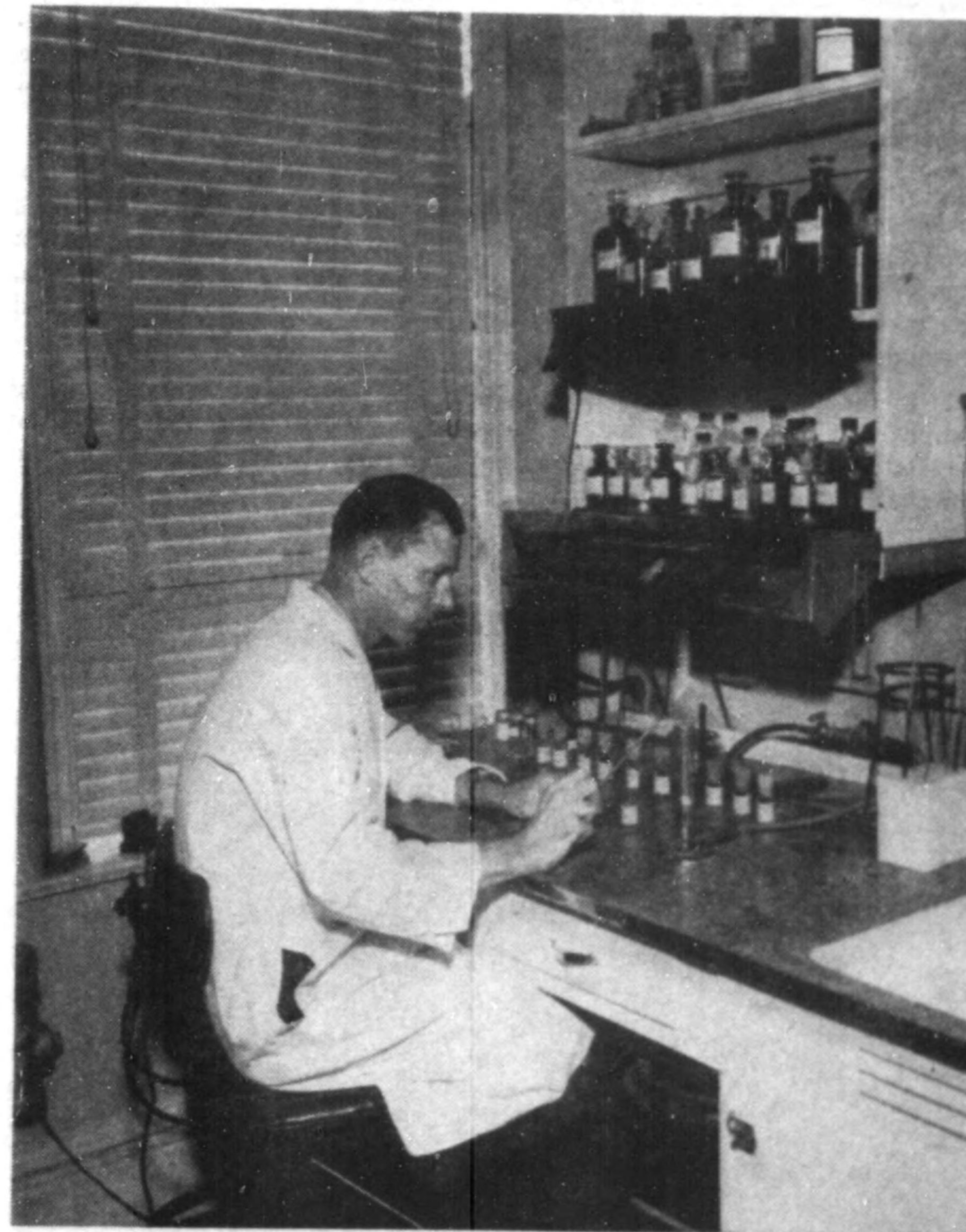
Naturally, the initial cost of basic equipment and supplies are reusable. Since the beginning of the program, and continuing through July 1, 1946, the entire cost of this service was \$36,422.00. The amount of plasma produced during that period, if purchased from commercial houses on the open market, would have cost \$76,000.00. This means a saving to the people of the state of \$39,578.00. An important point to remember is that if plasma had been purchased we would never have the wide distribution that now prevails because the cost would have been prohibitive. By distributing plasma free of charge, the State Health Department is making plasma available on a much wider basis, to be used wherever and whenever needed in the state.

LOOKING TOWARD THE FUTURE

Laboratory people are constantly striving to improve present methods and to incorporate newer procedures as a matter of routine policy. As a result, public health laboratory services have greatly increased in scope during the past five or ten years. Services offered now in North Dakota are comparable to those of any other state, although many phases of the laboratory program will have to be integrated with programs of other Divisions of the Health Department if definite results are to be achieved. In looking toward the future, we hope that certain phases of laboratory work can be developed to such an extent that the Division of Laboratories will be able to give better service to the medical profession. This, in turn, will mean better medical care for the people of the state.

DRIED HUMAN RED BLOOD CELLS

A procedure for desiccating red blood cells has been worked out by members of the staff so that it can be adapted to the equipment used in plasma dehydration. In the production of plasma, large quantities of residual red blood cells were discarded as waste material; however, these cells are now being used and distributed to physicians and hospitals for use as a dressing material for various types of wound healing.



The examination of sputum for tuberculosis is made by direct smear and microscopic study and by cultural studies.

Reports received on the use of these red cells for the treatment of wounds has been very encouraging and it is now felt that production and distribution should be conducted on a larger scale during the coming year. This service in connection with the plasma program is another example of public health laboratory service to the people of the state.

SUMMARY

It is evident from the foregoing report that the laboratories have been busy during the biennial period. Certain phases of laboratory work have increased and there is reason to believe that the work load will increase during the coming years. Additional help, especially for the preparation of laboratory media and the washing of glassware may have to be acquired.

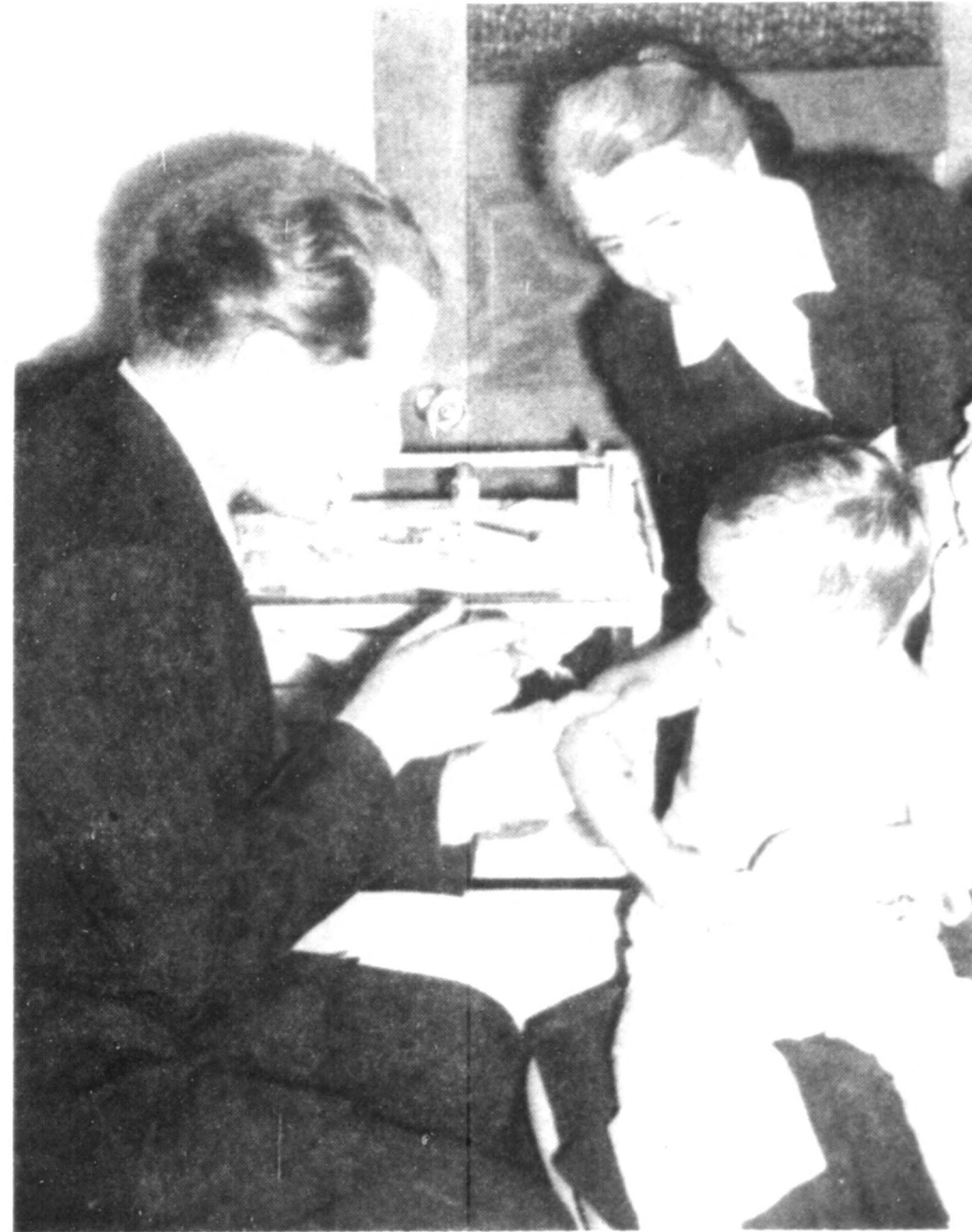
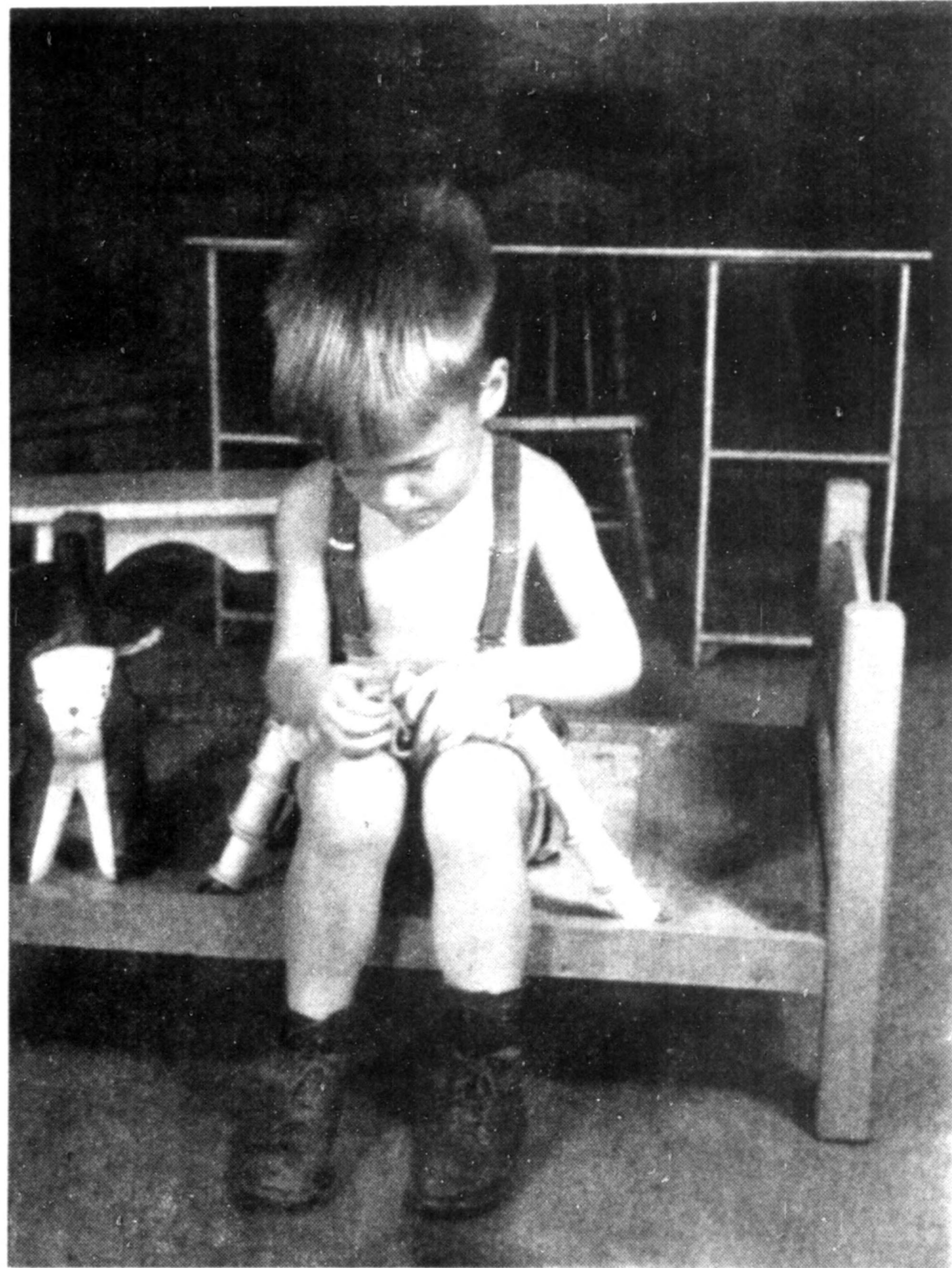
The blood plasma program has been extremely successful and has attracted much interest in other parts of the country. North Dakota's program has served as a pattern for other states contemplating such a service. Judging from reports on the use of plasma in North Dakota, the program has helped save the lives of many people and will expand through public demands.

If the laboratory is to continue to give its present service to the people of the state and to extend its activities, it will be necessary for the legislature to consider seriously an increase in the budgetary requirements for the Public Health Laboratories.

MATERNAL AND CHILD HYGIENE

MATERNAL AND CHILD HYGIENE

The Emergency Maternity and Infant Care Program overshadowed all other division activities during the biennium. Lack of a director or medical staff for the division placed responsibility for the entire program in the hands of the State Health Officer. Despite an incomplete program maternal mortality rates dropped from 2.9 in 1943 to 1.8 in 1944 and 1.1 in 1945. The infant mortality rate increased slightly from 34.7 in 1943 to 36.9 in 1944. In 1945 it dropped back to 30.7.



The child is protected against disease at the child health conference.

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Table 10 illustrates the percentage of deaths for the age group under one year:

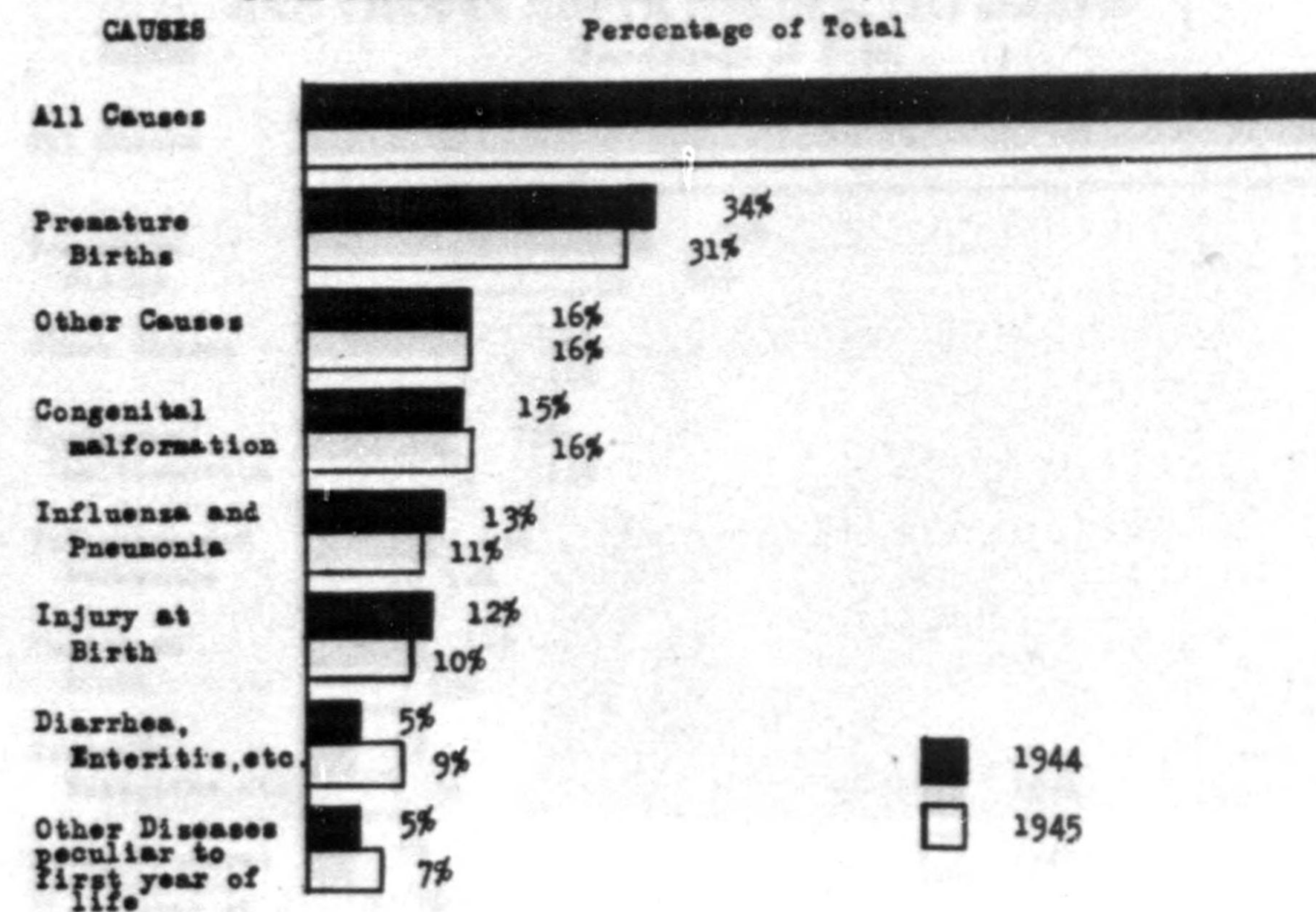
TABLE 10
Infant Deaths and Death Rates by Age Groups
Under One Year of Age in North Dakota

Age Group	No.	1944		1945		
		Rate per 1000 live births	Percent of Total deaths	No.	Rate per 1000 live births	Percent of Total deaths
Under 1 year	505	36.9	100	414	30.7	100
Under 1 month	342	25.0	68	279	20.7	67
Under 1 week	273	20.0	54	231	17.1	56
Under 1 day	169	12.4	33	135	10.0	33

Although the first year of life is the most dangerous for the child, from a health standpoint, the first five years are also full of hazards. In 1944 there were 505 deaths under one year and 122 deaths from one year to four years of age. In 1945 there were 414 deaths of children under one year and 102 deaths from one year through four years of age.

The principal causes of death for infants under one year of age and causes of death of children from one through four years of age are shown in figures 6 and 7. In 1944 and 1945 there were 20 deaths from

Figure 6
LEADING CAUSES OF DEATH FOR CHILDREN UNDER ONE YEAR IN NORTH DAKOTA, 1944 and 1945



diphtheria in North Dakota. As stated in the last biennial report this increase in the deaths from diphtheria indicates the need of more intensive preventive measures. Diphtheria can be prevented by immunization if all parents cooperate by having their children protected. At the present time immunization is not compulsory in the state of North Dakota, but if we are to prevent diphtheria all parents should have their children immunized against this disease. All infants should be immunized for diphtheria when they are six to nine months of age.

In the neonatal period which comprises children under one month of age, prematurity looms large as a cause of death. Neonatal death from prematurity, birth injury, congenital malformations, and stillbirths are closely connected with care during pregnancy and child birth, and indicate a definite need for more prenatal care. Stillbirths alone claimed 257 children in 1945 and 286 during 1944.

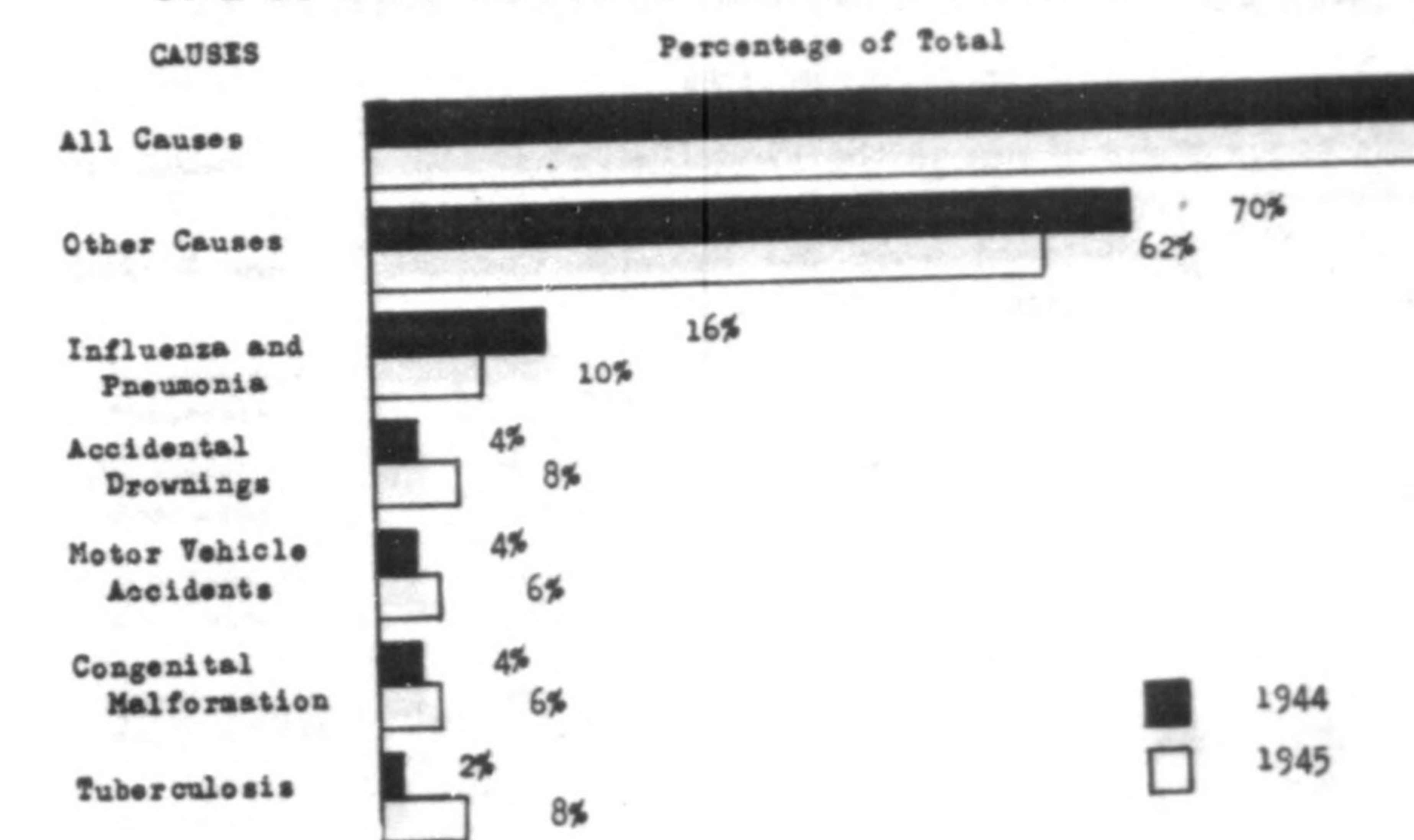
PRESCHOOL CHILD HEALTH CONFERENCES

An important method of reducing infant mortality is the preschool child health conference.

In order to keep the well child well and to promote his best state of health the Division of Maternal and Child Hygiene has continued to sponsor preschool child health conferences in all counties and cities where there is a public health nurse. These conferences have been held and conducted entirely by local physicians with remuneration from this office.

During the biennium there were 7723 children examined at the preschool conferences. These include those who were examined in the

Figure 7
LEADING CAUSES OF DEATH FOR CHILDREN FROM ONE TO FIVE YEARS IN NORTH DAKOTA, 1944 and 1945





Local physicians participate in Well-Child Conferences.

First District Health Unit, the Southwest District Health Unit and the city of Fargo.

There are permanent well child conferences for children from six weeks to six years of age in the First District Health Unit, Fargo and Bismarck at present. A cooperative venture in Bismarck and Burleigh County was discontinued when the Burleigh County Nursing Service ended in February, 1946.

There were 850 children who attended the conferences in the First District Health Unit, the Southwestern District, and the Fargo City Health Department, from July, 1944 to June, 1946. In Bismarck there were 6873 children who attended the conferences.

Upon request of counties not having the services of a nurse the Health Department through the Division of Public Health Nursing organized and assisted local physicians in conducting immunization clinics.

NORTH DAKOTA MATERNAL DEATHS

During 1944 there were 24 mothers who died as a result of the complications of pregnancy and childbirth. In 1945 there were 15 mothers who died of these complications. This is a rate of 1.8 in 1944 and 1.1 in 1945. The maternal mortality rates for the state of North Dakota since 1937 are as follows:

	Rate per 1,000 Live Birth
1937.....	4.7
1938.....	2.3
1939.....	2.5
1940.....	1.7
1941.....	2.6
1942.....	2.5
1943.....	2.9
1944.....	1.8
1945.....	1.1

The trend in maternal deaths is clearly downward. Variations from year to year are probably due to the small number of cases and not to be considered significant of changes in care or treatment.

TABLE 11
North Dakota Maternal Deaths—1940-1945

	1940	1941	1942	1943	1944	1945
Total Number	23	35	34	40	24	15
Abortion with mention of infection	3	5	4	4	2	..
Abortion without mention of infection	..	..	1	4	..	..
Ectopic gestation	4	1	1	5	..	2
Toxemia of pregnancy (death before delivery)	..	..	2	5	1	3
Other diseases and accidents of pregnancy (death before delivery)	..	..	2	1	..	..
Puerperal hemorrhage	3	6	7	8	6	3
Infection during childbirth and the puerperium	3	7	9	5	6	1
Puerperal toxemias	3	7	5	6	5	5
Other accidents and specified conditions of child birth	6	7	3	1	4	1
Other and unspecified conditions of childbirth and the puerperium	1	2	..	1	..	..

In 1944 fourteen per cent of the deliveries were home deliveries while in 1945 this had dropped to eleven percent. There has been a consistent drop in the last five year period for home deliveries. However, in a recent study made of the birth certificates it was found that it is through the increased delivery of births in hospitals in large communities that this has been brought about. In the rural areas and small towns the percentage of home deliveries is still high. A similar drop has been noted in the number of mothers who had no medical care at the time of delivery. This dropped from 275 in 1942 to 221 in 1943 and 122 in 1944 and down to 120 in 1945.

TABLE 12
Place of Delivery and Attendance

	1944		1945	
	No.	Per Cent	No.	Per Cent
Number of mothers delivered in hospital	11,802	86	11,944	89
Number of mothers not delivered in hospitals (delivered at home) ..	1,879	14	1,553	11
Number of mothers attended by physicians at the time of delivery	13,524	99	13,321	99
Number of mothers attended by midwife	35	0	56	0
Number of mothers that had no attendance (neither a physician or midwife)	122	1	120	1

EMERGENCY MATERNITY AND INFANT CARE PROGRAM

In North Dakota the EMIC Program went into effect on March 17, 1944. This program was retroactive to January 1st of that year. Total cases to July 1, 1944 were 614. A total of 3,631 cases were authorized from June 30, 1944 to July 1, 1946. This brought the program's total cases to 5,245. During this biennium the total number of maternity cases was 2,378 with a total number of infant cases set at 1,253. Table 13 indicates the authorizations for care.

TABLE 13
EMIC Authorizations in North Dakota
July 1, 1944—June 30, 1946

	Total	Maternity	Infant
July-Dec. 1944	1,118	833	285
Jan.-June 1945	995	610	385
July-Dec. 1945	855	532	323
Jan.-June 1946	633	403	260
Total	3,631	2,378	1,253
Total Program	5,245	2,899	1,346

Some of the information and facts brought to light through the EMIC Program are striking. The total number of sets of twins born in North Dakota under EMIC was sixteen. In addition there was one set of twins which was cared for under EMIC, but whose mother came under Army Emergency Relief. Another set under North Dakota EMIC was born in the State of Washington. Of the total number four sets of twins were born in Bismarck under this program.

Since it went into effect there have been 79 second pregnancies under this care program in North Dakota. One case of a third pregnancy is also recorded. At the present time several more patients have requested second confinement under this program but to date their eligibility has not been determined.

In addition to routine care there are cases requiring exceptional care. Approximately seven maternity cases and twenty infant cases have been classed as exceptional cases requiring more than twice the number of visits allowed by the program. Difficult procedures were used on approximately twelve infant cases which were also classed as exceptional.

NUTRITION

For years there has been an increasing interest and realization of the importance of nutrition in developing and maintaining strong, healthy bodies. The war definitely focused the attention of the nation on nutrition and its importance to the fighting front and the home front.

During the biennium the assistant nutritionist carried on activities in the absence of a nutrition consultant.

The program of the nutrition service is educational in nature and its objective is to improve the health of North Dakota's citizens by improving their nutrition. The program has been carried out in the following ways:

Diets of 1445 preschool children were discussed with 973 mothers at preschool conference. Suggestions were given for food preparation, additions to make diets adequate, ways to induce children to eat the proper foods and low cost foods and substitutions which might be made. These conferences revealed that many diets are inadequate because of (1) ignorance on the part of the parents as to the daily food requirements of children, (2) parents knowing what the children should have but not con-



Consultation services on nutritional problems are part of the child health conference.

sidering it important enough to make an intelligent effort to see that the child actually ate the proper food and (3) inadequate income—happily affecting a very small number of North Dakota's families in the last biennium. The following chart gives an interesting comparison of adequacy of diets during the last three years.

	1943 %	1944 %	1945 %
Milk	71	79	85
Orange or citrus fruit	68	78	84
Vegetable, yellow or green	67	74	71
Vegetable, raw	40	55	70
Eggs	57	78	83
Cereal, cooked	52	73	74
Cereal, prepared	38	47	56
Vitamin D	52	37	36
Regular meals	60	76	89

The effects of the nutrition education campaign are being reflected in an increased knowledge on the part of the mother as to the requirements of an adequate diet.

Particular interest has centered on encouraging the teaching of nutrition in elementary schools. To achieve this aim the following activities were carried on:

- (1) Programs at summer sessions for teachers at four Teacher Colleges.
- (2) A one day check of diets of 2832 grade school children in five North Dakota counties in cooperation with the State Nutrition Committee.
- (3) Educational talks at Teachers Institutes in seven counties both in follow-up on the survey and to induce more schools to participate in school lunch programs.
- (4) Programs at vocational home economics teachers meeting in 1945 and workshop on teaching nutrition in elementary schools.
- (5) Prepared menus and suggestions for School Lunch News and served on school lunch committee.

The services of Dr. Walter Wilkins of the United States Public Health Service were obtained for a nutrition clinic demonstration through efforts of the Health Department and the State Nutrition Committee. At

The Public Health Nurse carries her message directly into the home. a meeting open to professional and interested lay persons Dr. Wilkins pointed out evidences of both nutritional deficiencies and good nutrition. He also did a blood hemoglobin study of high school and junior high school students in Bismarck.



Care of the Newborn

The nutritionist gave consultant service to Boy and Girl Scout programs in planning menus for summer camps and in preparing nutritional material for the Scouts.

Pamphlets and leaflets were prepared and distributed on the following subjects: