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## THE PREVENTION OF TYPHOID FEVER.

*Sometimes called "Enteric Fever," "Gastric Fever," or "Pythogenic Fever," and by the Germans "Abdominal Typhus."*

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[ 99. ]

Typhoid fever is a common and protracted disease, terminating fatally in about one case out of eight or ten.

The number of deaths returned as having occurred in Michigan from typhoid fever averages about five hundred per year; but it is believed that only about one-half of the deaths are reported, so that the number of deaths which actually occur in Michigan from typhoid fever is probably about one thousand per year; and the number of persons in Michigan sick with typhoid fever is probably about eight or ten thousand each year. A large proportion of that sickness and mortality can be and ought to be prevented.

The greatest number of deaths from this disease is of persons in the prime of life, and this should prompt to greater efforts for the prevention of the disease. Persons of all ages have the disease, and even though they have it in many instances in a mild form, yet they may be the medium of communicating the disease in a fatal form to others, for although it is not one of the most contagious diseases, **Typhoid Fever is believed to be a communicable disease.**

Typhoid fever is believed by many to be caused by a special contagium, and nearly all agree that the poison, whether specific or not, may be conveyed to other persons by drinking water contaminated by discharges from the bowels of a person affected with the disease, or by leachings from the bodies of those who have died of typhoid fever.

**Mode of Spread or Communication.**—Experience seems to prove that, with certain precautions, attendants upon those sick with typhoid fever are not in danger of contracting this disease directly from the patient. Water chemically impure does not necessarily cause the disease; but drinking-water contaminated with the fecal discharges of a typhoid-fever patient is believed to be the most common source or vehicle of typhoid fever. While the possibility of its originating in other ways is not denied, the frequent outbreaks of this disease which are traceable directly and unmistakably to a contaminated water-supply, seem to point to this as the chief source of danger. The disease has also been traced to milk diluted with infected pump-water, and apparently in some cases to emanations from sewers and cesspools. It seems to prevail most in times of drought, in the fall of the year, especially after a period of high temperature, and when the water in wells is low and its contaminations most concentrated.

Filth and bad sanitary condition of premises generally, probably increase the danger of spreading the disease. Typhoid fever has been styled a "filth disease."

**Protect the Water-supply.**—The most scrupulous care should be taken to keep the present sources of drinking-water pure, and to procure future supplies only from clean sources. The general water-supply of cities and villages is a matter of the greatest concern, and should be procured from places where there can be no probability of immediate or remote contamination. The well-known outbreak of typhoid fever at Plymouth, Pa., where over a thousand cases and many deaths occurred, is apparently an illustration of how great a calamity may follow the fouling of a *general* water-supply by the discharges of a person sick with typhoid fever. When there is no general water-supply, much may be done to protect the wells by the abolition of cess-pits, and privy-vaults, by the use of dry earth in privies and by the frequent removal therefrom of all their contents.

Great care should be had to prevent the contamination of the water-supply by discharges from the bowels of a person sick with typhoid fever, as by drainage into wells, springs, or other water-supply, from a privy-vault, sewer, drain, or cemetery. Privies often drain into wells, unsuspected by those who use the water. Should typhoid discharges pass into such a privy an outbreak of typhoid fever among those using the water from a neighboring well would be likely to occur. If such a well were the source of the general water-supply of a city, typhoid fever might soon be epidemic there. Extraordinary care should be taken to prevent typhoid fever discharges from entering any general water-supply from a well or from a small stream. The use of water from a source likely to be infected with excreta from a typhoid fever patient should be promptly stopped; and great care should also be given to the milk supply.

There is good reason to suspect the water of a well whenever a vault is situated within one hundred feet of it, particularly if the soil be porous. In numerous instances fluids from excreta have leached into wells from much greater distances; and it has been proved that a well thirty rods from a cemetery received water which had filtered through the soil of the cemetery.\* Dangerously contaminated water may be, and often is found to be, clear and colorless, and to have no bad taste.

**Period of Incubation.** The interval of time between receiving the cause of typhoid fever into the system and becoming sick therefrom is not uniform; but it is very often about eleven days, sometimes as long as twenty-one days.

**Householders and Physicians** must immediately give notice of the first case, and of every case of a "disease dangerous to the public health," and such is typhoid fever, to the health officer or to the board of health. This

\* Page 66, Ypsilanti Sanitary Convention, Supplement to the Annual Report of the Michigan State Board of Health, 1885.

is required by sections 1734 and 1735, Compiled Laws of Michigan, 1871, as amended by Act No. 11, Laws of 1883, which, with the new section (50) added in 1883, are as follows:

(1731.) SEC. 43. Whenever any **householder, hotel keeper, keeper of a boarding house, or tenant** shall know, or shall be informed by a physician, or shall have reason to believe, that any person in his family, hotel, boarding house, or premises is taken sick with small-pox, cholera, diphtheria, scarlet fever, or any other disease dangerous to the public health, he shall immediately give notice thereof to the health officer, the president or the clerk of the board of health of the township, city, or village in which he resides. Said notice shall state the name of the person sick, the name of the disease, the name of the householder, hotel keeper, keeper of boarding house, or tenant giving the notice, and shall, by street and number, or otherwise, sufficiently designate the house in which he resides or the room in which the sick person may be; and if he shall refuse or neglect immediately to give such notice he shall forfeit for each such offense a sum not exceeding one hundred dollars\*: *Provided*, That this penalty shall not be enforced if a physician in attendance has given to the health officer or other officer hereinbefore mentioned an immediate notice of said sick person, and true name of the disease, in accordance with the requirements of this section.

(1735.) SEC. 44. Whenever any **physician** shall know that any person whom he is called to visit, or who is brought to him for examination, is infected with small-pox, cholera, diphtheria, scarlet fever, or any other disease dangerous to the public health, he shall immediately give notice thereof to the health officer, the president, or the clerk of the board of health of the township, city, or village in which the sick person may be; and to the householder, hotel keeper, keeper of a boarding house, or tenant within whose house or rooms the sick person may be. The notice to the officer of the board of health shall state the name of the disease, the name, age, and sex of the person sick, also the name of the physician giving the notice; and shall, by street and number, or otherwise, sufficiently designate the house or room in which said sick person may be. And every physician and person acting as a physician, who shall refuse or neglect immediately to give such notice shall forfeit for each such offense a sum not less than fifty nor more than one hundred dollars\*: *Provided*, That this penalty shall not be enforced against a physician if another physician in attendance has given to the health officer, or other officer hereinbefore mentioned, an immediate notice of said sick person, and the true name of the disease, in accordance with the requirements of this section.

SEC. 50. For each complete notice in writing to an officer of the board of health, in full compliance with the preceding section, requiring from physicians or other persons notices of diseases dangerous to the public health, the physician who gave the notice shall be entitled, on duly certifying that each notice was correct, and when the bill has been duly audited by the board of health, to receive from the township, city, or village, in which the notice was given, the sum of ten cents.

**Upon receipt of such notice, the local board of health has duties to perform** in taking measures to restrict the spread of the disease, which it is a great violation of public trust for the board to neglect or postpone. The law is very plain as to the nature and the importance of these duties. One section of the law is as follows:

(1732.) SEC. 41. When the small pox, or any other disease dangerous to the public health, is found to exist in any township, the board of health shall use all possible care to prevent the spreading of the infection, and to give public notice of infected places to travelers, by such means as in their judgment shall be most effectual for the common safety.

**Some of the duties of the local board of health, and of the health officer.** In order that no time may be lost, it is the duty of every board of health to make provision for prompt action by its health officer, authorizing and directing him to be prepared at all times, as executive officer of the board, to take certain action without waiting for a meeting of the board whenever a case of typhoid fever occurs within its jurisdiction. Some of these duties of the health officer may be briefly suggested as follows: He should:—

\* **Supervisors** must prosecute for all such forfeitures; township officers must give notice to supervisor; prosecuting attorney to conduct suit if requested; see sections 6852, 6853, and 6855, Compiled Laws of Michigan, 1871. **Health officers of villages and cities** must notify prosecuting attorney of all violations of this section—see Act No. 157, Laws of 1879; the **prosecuting attorney** must prosecute for all such forfeitures incurred within his county,—see section 6855, Compiled Laws of 1871.

1. Give public notice of infected places, so that no person may unguardedly drink water or take food from a source likely to be contaminated.

2. Investigate the probable source and mode of origin of the disease. If probably from a contaminated well or general water-supply, see that measures are taken by stopping its use, by boiling it, or otherwise to prevent further cases being caused in the same manner.

3. Order and enforce the disinfection of all discharges from the bowels of patients sick with typhoid fever. It is safest that the discharges of all persons who have diarrhea shall be disinfected.\*

4. Disinfect the contents of the privy on the premises, or any other that has been used by the patient.†

5. Order and secure the disinfection of all articles of clothing or bedding that have been soiled by discharges from the patient.

6. Secure the coöperation of the people in the prevention of this disease, by teaching them its modes of spread, the best methods for its prevention, and the greater importance of efforts for its prevention in times of drought and low water in wells.‡

7. Act 137, laws of 1883, specifies several other duties which the health officer should perform, among which may be mentioned, as especially applicable in this disease, the disinfection of the room and all articles likely to be infected, before allowing their use by other persons; the prompt and full reports to the Secretary of the State Board of Health, as well as to the president of the local board of health.

**The local board of health and the physician in charge of a case of this disease should co-operate for its restriction.** The local board of health should especially guard against its spread by cases where no physician is employed.

**Personal Precaution.**—Do not drink water which has a bad taste or odor, or which comes from a source that renders it liable to be impure, especially if there is reason to believe that it may contain something derived from a person sick with typhoid fever.

**Disinfect the Bowel Discharges of the Sick.**—This is a measure of prime importance. The discharges are believed to acquire more virulent properties, after a few days, particularly when thrown, without disinfection, into a vault or other receptacle of decomposing filth. The bowel discharges should therefore, in all cases, be received upon papers or old cloths and promptly burned, or be received in vessels and thoroughly disinfected as

\*Even cases so lightly sick as to be able to walk about and work are very dangerous; as in the well known case at Caterham, England, where, in 1879, 352 cases of fever were caused, it is believed, by the diarrheal discharges from one such workman getting into the general water-supply of the towns of Caterham and Red Hill.

†How isolated privies may become infected is illustrated by a case of a peddler sick with typhoid fever, admitted into Bellevue Hospital, New York City, who is reported to have said that while suffering from the diarrhea in the early stages of his disease, he had visited between forty and fifty different privies.

‡Pamphlets containing such information, issued by this State board of health, for distribution to neighbors of families in which there is typhoid fever, or to other persons likely to read them, may be had on application to the Secretary of the State Board of Health at Lansing.

follows: Disinfect each discharge from the bowels by thoroughly mixing with it at least one ounce of chlorinated lime in powder, or one quart of "Standard Solution, No. 1," recommended by the American Public Health Association's committee.\* In country districts, villages, and small cities, where the privy is not far distant from a well, a discharges should not be thrown into a privy-vault, but, after being disinfected, they should be carried a greater distance from any source of drinking-water and then covered with earth.

Rags, closet-paper, or other similar material used about the patient should be immediately burned.

**Soiled clothing, towels, bed-linen, etc.,** on removal from the patient, should soon be placed in a pail or a tub of boiling-hot zinc solution, made in proportions as follows: Water, one gallon; sulphate of zinc, four ounces; common salt, two ounces. Soiled clothing should, in all cases, be disinfected before sending away to a laundry, either by boiling for at least half an hour (it may well be boiled in the zinc solution), or by soaking in a strong solution of chlorinated soda.

**Bodies of those dead from typhoid fever** should be wrapped in a cloth wet with a strong solution of chlorinated soda, or with "Standard Solution No. 1," † or with a zinc solution, and at once buried; the zinc solution should be made in proportions of one-half pound of chloride of zinc to one gallon of water, or as follows: Water, one gallon; sulphate of zinc, eight ounces; common salt, four ounces.

**After a death or recovery from typhoid fever** the room in which there has been a case of typhoid fever, whether fatal or not, should, with all its contents, be thoroughly disinfected by exposure for twenty-four hours to strong fumes of burning sulphur, and then it should for several hours, if possible for days, be exposed to currents of fresh air.

**Rooms to be disinfected** by sulphurous fumes must be vacated. For a room ten feet square at least three pounds of sulphur should be used; for larger rooms proportionately increased quantities, at the rate of three pounds for each one thousand cubic feet of air-space.

Hang up and spread out as much as possible all blankets and other articles to be disinfected; turn pockets in clothing inside out, and otherwise facilitate the access of the sulphurous fumes to all infected places.

Close the room as tight as possible, place the sulphur in iron pots or pans which will not leak, supported upon bricks over a sheet of zinc or in a tub containing water, so that in case melted sulphur should leak out of the pot the floor may not be burned; set the sulphur on fire by hot coals or with the

\* "Standard Solution No. 1," of the American Public Health Association's Committee, is made by adding to each gallon of soft water, four ounces of chloride of lime of the best quality, which should contain at least 25 per cent of available chlorine. † Use one quart of this solution for the disinfection of each discharge in cholera, typhoid fever, etc. Mix well and leave in vessel for at least one hour before throwing into privy-vault or water-closet."

† To each gallon of soft water, add four ounces of "chloride of lime" of the best quality, which should contain at least 25 per cent of available chlorine.

aid of a spoonful of alcohol lighted by a match; be careful not to breathe the fumes of the burning sulphur, and when certain the sulphur is burning well leave the room, close the door, and allow the room to be closed for twenty-four hours.

It is especially important that the *contents* of the privy be disinfected. For this purpose use four ounces of the best quality of "chloride of lime" to each gallon of material in the vault.

**Boil the Drinking Water.**—Immediately on the appearance of typhoid fever a careful examination should be made of the surroundings of the house, and particularly of the source of the water used, to determine, if possible, whether it has been contaminated by leachings from privies or other sources of filth. If the sick person has been at home, and not away where the disease might be contracted, it will be safest that the water used by the sick person immediately before having been taken sick should not be used again for drinking or culinary purposes unless it is boiled. It is believed that thorough boiling will destroy the germs or poison of the disease. Ordinary filtering will not do so.

**Separation of the Sick from the Well.**—As typhoid fever is seldom, if ever, transmitted directly from one person to another, strict isolation is not necessary or important in preventing its spread. It would be wise, however, for all who can properly do so, to keep away from the premises.

**Perfect cleanliness** of nurses and attendants should be enjoined and secured. As the hands of nurses may become contaminated by the poison of the disease, a good supply of towels and basins,—one containing a solution of chlorinated soda\*, chlorinated lime, or the zinc-solution, and another for plain soap and water,—should always be at hand and freely used.

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\* To one part of Labarraque's Solution (liquor sodæ chlorinatæ), add five parts of soft water.

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With the view of lessening the number of cases of and deaths from typhoid fever in Michigan, the foregoing is published by the STATE BOARD OF HEALTH for free distribution throughout the State, especially to officers and members of local boards of health. Physicians being to some extent the custodians and conservators of the public health, copies of this document are also sent to physicians in Michigan, in the hope that they will aid in diffusing among the people such knowledge of the nature of typhoid fever as will enable the people better to co-operate with them and with boards of health for the restriction of the disease and a decrease of sickness and deaths therefrom.

Any communication upon the subject may be addressed to: OFFICE OF STATE BOARD OF HEALTH, LANSING, MICHIGAN, from which, on application, any person may obtain a copy of this document or other papers containing more complete statements relative to this disease.

In order that the document may do the greatest possible good, it is hoped that each one who receives it will not only make such use of it as will tend to disseminate most widely the suggestions and statements of facts contained therein, but will also *act for the restriction or prevention of this disease* in accordance with its suggestions, or by other effective measures.

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**After reading this document with sufficient care to remember the principles involved please preserve it for future reference.**