

# TYPHOID FEVER EPIDEMIC

## FOLLOWING A WEDDING RECEPTION

Charles T. Caraway, D.V.M., M.P.H.

John M. Bruce, M.D., M.P.H.

EPIDEMICS of typhoid fever resulting from a common source are becoming increasingly rare. The majority of outbreaks observed during the past decade have been due to contact transmission among low socioeconomic groups who have inadequate sanitary facilities and who practice poor personal hygiene habits. An epidemic of 31 cases in southern Louisiana in May 1960, however, demonstrates that common-source outbreaks involving large numbers of people may still occur when carriers of typhoid fever are allowed to assist in the preparation of food for consumption by the public. It also emphasizes the need for finding carriers and placing them under health department surveillance.

By the time the Louisiana State Board of Health was notified of the epidemic, 20 patients were receiving treatment from private physicians. The causative agent had not been isolated. The diagnoses had been based on clinical and serologic findings. A preliminary investigation revealed that some of the patients had attended a wedding reception at a meeting hall on April 23, 1960, and that others had eaten some of the leftover food brought to them after the reception.

Since food appeared to be the vehicle of transmission, a list of persons who attended the reception, as well as those who did not attend but ate the same food, was obtained. These persons were interviewed for epidemiological data. Private physicians and hospital records

supplied clinical and laboratory data on the patients, and the patients reported symptoms and dates of onset.

Refreshments served at the reception consisted of home-prepared chicken salad sandwiches, cake from a commercial bakery, and punch made from a mixture of commercial beverages. The sandwiches were suspected early in the investigation because some of the patients who did not attend the reception ate sandwiches but no cake or punch.

Two women boiled and boned the chicken and cooked the eggs on the afternoon of April 22. The eggs and meat were refrigerated until approximately 7 a.m. the following day. At this time the eggs were peeled, the meat was ground, and mayonnaise, celery, salt, and pepper were added. All the ingredients were mixed by one of the women who had prepared the chicken and eggs the previous day. Four additional women assisted in spreading the sandwiches. About 9 a.m. the sandwiches were taken to the hall where they were served about 11 a.m.

In an effort to isolate the causative agent and to confirm the diagnosis in as many patients as possible, feces, urine, and blood specimens were requested from each patient. Because of the possibility of mild, unrecognized, or subclinical cases, each person who was at the reception or had eaten some of the food was asked to submit two specimens of feces to the State board of health for bacteriological examination. Also, each of the six women who participated in preparing the sandwiches submitted at least three samples of feces and three of urine, which were collected on separate days.

### Results

A total of 31 persons became ill with typhoid fever: 25 of the 79 who attended the reception

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*The authors are with the section of epidemiology in the Louisiana State Board of Health. Dr. Caraway is veterinarian epidemiologist and Dr. Bruce is chief. They were assisted in this study by Dr. M. F. Houston, health unit director, Marjorie Boudreaux and Laura Bell Porche, public health nurses, and Dr. George H. Hauser and staff of the division of laboratories, all with the State board of health.*

and 6 of the 19 who did not attend but ate some of the same food. Seventy of the persons who attended the reception or ate some of the food, including 24 patients, lived in the community where the reception was held. The remainder lived in three neighboring parishes.

One attack of typhoid fever, not tabulated in this report, began 17 days after the reception in an 8-year-old boy who lived in the community where the reception was held. He did not attend the reception and he denied having eaten any of the food served there or having visited the hall prior to or after the reception. However, his father keeps the key to the hall. *Salmonella typhosa* was isolated from a specimen of his feces which was subsequently found to be the same Vi bacteriophage type as that found in the specimens, which had been confirmed by positive cultures, of the other patients. Although this case could not be definitely tied in with the outbreak, the investigators believe that the boy probably ate one of the sandwiches.

Attack rates were calculated for the refreshment items served (table 1). The analysis shows that 31, 35.2 percent, of 88 persons who ate sandwiches became ill, and the 10 persons who did not eat them did not become ill. All of the 31 patients had eaten sandwiches. Only 27 had cake, and 24 had punch. There was no marked difference in attack rates for those patients who had eaten cake and punch as compared with those who did not. Further analysis showed that three patients who did not attend the reception had eaten only sandwiches.

As shown in the figure, incubation periods ranged from 7 to 34 days, with a mean of

**Table 1. Typhoid fever attack rates per 100, by type of food consumed by 98 persons during or after wedding reception**

Food	Ingested			Did not ingest		
	Total	Number ill	Rate	Total	Number ill	Rate
Chicken salad sandwiches	88	31	35.2	10	0	0.0
Cake	80	27	33.7	18	4	22.2
Punch	73	24	32.9	25	7	25.9

**Table 2. Typhoid fever attack rates per 100 among persons who ate chicken salad sandwiches during or after wedding reception, by age group**

Age group	Total number	Number ill	Attack rate
0-5	6	3	50.0
6-15	10	5	50.0
16-25	16	6	37.5
26-45	28	11	39.3
46-65	23	6	26.1
Over 65	5	0	0.0
Total	88	31	35.2

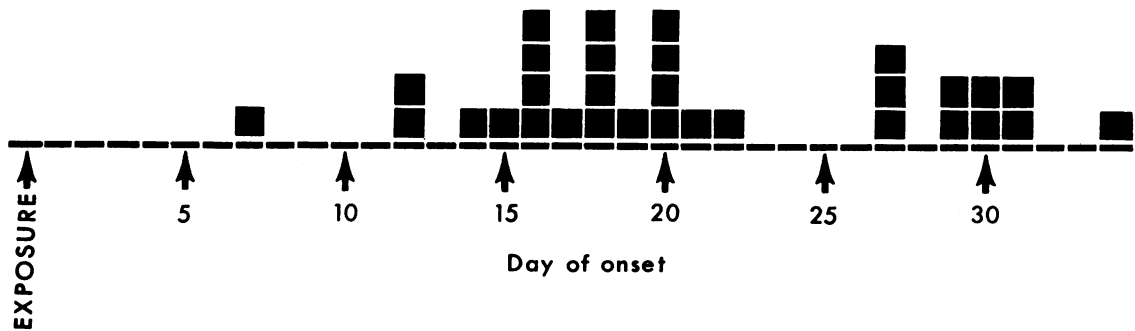
21 days. Sixteen patients were hospitalized for an average of 7.1 days per person. The frequency of symptoms reported by the 31 patients is shown below:

Symptoms	Number of patients	Percent of patients
Fever	30	97
Chills	27	89
Headache	26	84
Sweats	23	74
Weakness	21	68
Nausea	18	58
Sore throat	15	48
Stiff neck	13	42
Vomiting	11	36
Constipation	10	32
Diarrhea	9	29
Rash (rose spots)	6	19

The patients ranged in age from 22 months to 64 years. The highest attack rates occurred in those aged 15 years and younger (table 2). Of the 88 persons who ate the sandwiches, 37 were men, 12 (32.4 percent) of whom were affected, and 51 were women, 19 (37.3 percent) of whom became ill.

Typhoid vaccination histories, given by persons who ate sandwiches and verified by health unit records when applicable, were classified according to three broad categories, and attack rates were calculated for each group (table 3). The first category, which included all persons who had received a primary series at any time, was subdivided into three groups according to the date when the last inoculation, either primary series or booster, was received. Comparison of the attack rates for these persons, although the numbers are small, with the rate

Thirty-one cases of typhoid fever, by number of days from exposure to onset



for those who had never been vaccinated, indicates that no protection was afforded those persons who had a primary series of typhoid vaccination. Of seven persons who had been vaccinated within the previous 2 years, three developed typhoid fever. Each of these three had had a booster inoculation in 1959; one had the primary series in 1953, one in 1957 plus a booster in 1958, and the other had his primary series in 1958.

The first laboratory-confirmed case was in a patient from a neighboring parish. *S. typhosa*, Vi bacteriophage type E1, was cultured from his feces and blood. Subsequently, 11 additional cases of typhoid fever were confirmed by positive cultures; 8 from feces, 1 from feces and blood, and 2 from urine. All cultures were Vi bacteriophage type E1. One additional patient whose blood specimen was believed to have been switched with that of his wife might also be counted. Although her blood specimen was proved positive and his negative, the hus-

band had manifested typical symptoms of typhoid fever and the wife had none. When blood specimens were taken and cultured the second time, each was negative, the wife's showing no typhoid agglutinins and his showing an H antigen agglutination titer of 1:160 and an O antigen agglutination titer of 1:40.

Typhoid fever had not been considered by some of the private physicians when diagnosing the illness until they were notified of their patients' exposure and that the diagnoses had been confirmed in other patients. Two patients originally misdiagnosed were subsequently confirmed as having typhoid fever by positive findings in specimens of their feces. One of these patients had denied having any symptoms when she had been interviewed previously. When told of her confirmed diagnosis, she admitted having had mild symptoms and seeing her physician. She had submitted two specimens at the time when all the persons who had attended or had consumed some of the food from the reception were requested to.

Feces and urine specimens from four of the six women who prepared the sandwiches were negative. One woman became ill on May 10, 17 days after the wedding. On May 30 she submitted a specimen of feces which yielded *S. typhosa*. The other woman, who was one of the two who had boiled and boned the chicken on April 22, submitted specimens of feces on May 26, June 7, and July 30, all of which yielded positive findings. A urine specimen collected on June 7 was also positive; however, this specimen may have been contaminated with feces by the patient at the time of collection. This 68-year-old woman denied any recent symptoms. Approximately 30 years ago

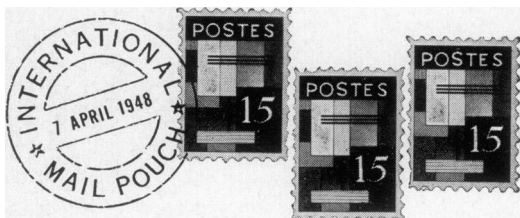
**Table 3. Typhoid fever attack rates per 100, by vaccination history, among persons who ate chicken salad sandwiches during or after wedding reception**

Vaccination history	Total	Number ill	Attack rate
Primary series at any time.....	37	17	45.9
No booster or series in past 5 years.....	24	12	50.0
Last booster or series 3 to 5 years ago.....	6	2	33.3
Last booster or series less than 3 years ago.....	7	3	42.3
Never vaccinated.....	46	13	28.3
Unknown.....	3	1	33.3

her son and a sister had typhoid fever, but she gave no history of ever having the disease. Her most recent illness was influenza in 1958. She is believed to be a chronic carrier and the source of the infection which caused the epidemic.

### Discussion

This epidemic provided an opportunity to study the effectiveness of typhoid vaccine by comparing attack rates in vaccinated and non-vaccinated groups of persons whose exposure was believed to be reasonably equal. Although the result failed to support any concept that the vaccine affords protection against typhoid fever, it should not of itself discourage the use of the vaccine. It should, however, prompt



### The Windmill of Jogjakarta

The first exploratory well in the area and the first windmill in Indonesia is giving 5,000 people in Jogjakarta, Java, a dependable water supply. With a mild breeze from the Indian Ocean, the windmill will bring more than 10 gallons per minute from a depth of 300 feet. The completion of the well in December 1959 cut by 3 miles the distance some people had to carry water and has generated further development of the area.

Indonesia's Bureau of Land Utilization started a well-drilling program to assist the farmers in this drought-stricken area. Sites for exploratory drilling were recommended after a geo-electric survey by the geology service of the Department of Public Works of Indonesia and the geology branch, Industry Division, U.S. Operations Mission.

The first exploratory boring struck water in large quantities. Although funds were available only for exploratory work, public interest was so great that the Sultan of Jogja, the Provincial Department of

other investigators into pursuing the question of the effectiveness of typhoid vaccine, which has long been a matter of discussion.

### Summary

In southern Louisiana, 31 cases of typhoid fever developed among 88 persons who ate chicken salad sandwiches which were prepared for a wedding reception. One of the women who prepared the sandwiches was discovered to be a typhoid fever carrier. The same Vi bacteriophage type of *Salmonella typhosa* was isolated from the carrier and all of the patients yielding positive cultures.

Comparison of attack rates for those who had been vaccinated and for those who had not indicated that no protection was afforded by the typhoid vaccine.

Public Works, and provincial and local officials joined forces to provide the materials and supplies to complete the well. The Bureau of Land Utilization produced a windmill from commodities supplied by the International Cooperation Administration and supervised its erection.

At first only water caught in carrying cans was saved, but as the long dry season approached, the villagers mobilized their scanty resources and successfully appealed to local authorities for help in building a storage tank.

—ICA Health Summary, July–September 1960

### Water for Arequipa

Arequipa, Peru's second largest city, last February opened a new water and sewerage system financed in part by a \$3.9 million loan, the first extended by the Inter-American Development Bank. The project was conceived and designed by Peruvian engineers assisted by the Pan American Sanitary Bureau.

In addition to providing the water and sewerage connections lacking for 37 percent of Arequipa's 123,000 population, the project is also expected to boost industrial and commercial development in southern Peru.

The new facilities will be constructed over the next 15 years, and the waterworks are designed for future expansion. Consumers' payments will make the water system self-supporting.