

A Gastroenteritis Outbreak From Food

R. C. PERRIELLO

Health Department, Attleboro, Massachusetts

AN outbreak of illness of 57 known cases suggestive of food poisoning from staphylococcus toxin occurred among the employees of a defense plant in the city of Attleboro, Massachusetts.

The outbreak occurred on July 28, 1943. Investigation by the local and district state health officials disclosed that there were fourteen foods eaten at one or more of the three times of serving, namely, at 10:00 A.M., at 12 noon, and at 3 P.M. The foods were prepared, for the first time, at the plant cafeteria. The 10 A.M. menu consisted of raw milk, hot coffee (the pasteurized cream used being diluted with raw milk) and doughnuts. The noon meal consisted of raw milk, hot coffee (same as above), hamburg, potato salad, watermelon, iced coffee (the cream used was also diluted with raw milk), bottled pasteurized milk-drink, and soda. The foods served at the 3 P.M. meal were raw milk, hot coffee (same

as above), iced coffee (same as above), soda, and cake.

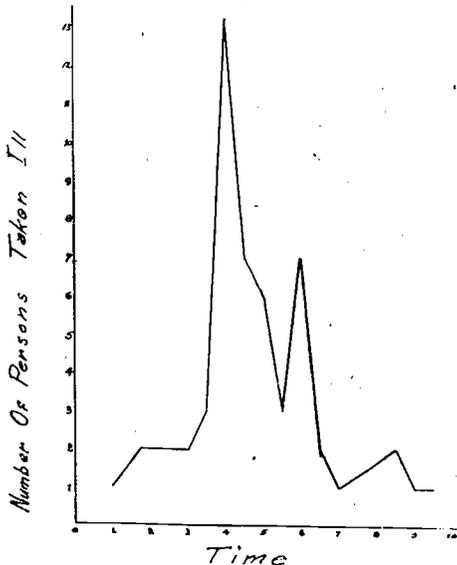
INCUBATION PERIOD

The first person became ill between 1:00 P.M. and 1:30 P.M. and the peak of the onset was between 3:30 P.M. and 4:00 P.M. (See Tables 1 and 2.)

TABLE 1
ESTIMATION OF INCUBATION PERIOD

Time	Number of persons taken ill
1:00-1:30.....	1
1:30-2:00.....	2
2:00-2:30.....	2
2:30-3:00.....	2
3:00-3:30.....	3
3:30-4:00.....	13
4:00-4:30.....	7
4:30-5:00.....	6
5:00-5:30.....	3
5:30-6:00.....	7
6:00-6:30.....	2
7:00.....	1
8:30.....	2
9:00.....	1
9:30.....	1

TABLE 2



THE CLINICAL PICTURE

The illness was acute with severe vomiting, prostration, diarrhea, and abdominal cramps. There were no fatalities. Thirty-four of the employees were treated at the local hospital, and 23 others, who were ill, were treated at home by their family physicians or received home treatment. Twenty of the 34 persons treated at the hospital were released and 14 were confined to the hospital. (See Table 3.)

Of the 14 who were confined to the hospital, 9 were released the second day, and 5 remained at the hospital. Of these, 4 were released the third day, and the last patient was released on the fifth day after the outbreak.

Among 23 persons who were interviewed but who were not ill, 23 were exposed to drinks containing raw milk, 6 were exposed to potato salad, and 11 were exposed to hamburg steak. There were 10 individuals who did not eat the noon meal but had eaten at the morning or afternoon meals, or both, and none became ill. All of these 10 persons were exposed to drinks containing raw milk. Of the 53 individuals who were ill and interviewed, 49 were exposed to drinks containing raw milk, and 4 were not exposed to raw milk but were exposed to potato salad. It was learned that 50 of these same 53 individuals were exposed to potato salad and that 3 were not exposed to

TABLE 3
SUMMARY OF THE CLINICAL PICTURE OF THE INDIVIDUALS WHO WERE HOSPITALIZED

Persons	Number of hours hospitalized	Temperature	Pulse	Respiration
1	24	96.2-98.6	90-80	20
2	24	99.8-98.6	100-85	20
3	48	96.8-98.6	80-80	20
4	24	100-98.6	110-80	20
5	120	99-98.6	95-70	25-20
6	48	96.8-97	90-60	20
7	48	98.6-98.6	80-73	20
8	48	97.8-98	72-80	20
9	24	98-98.6	88-80	20
10	24	97.8-99.2	75-89	24-20
11	24	98-98.6	79-88	20
12	24	99.5-98	95-75	20
13	24	98.6-98.2	68-56	17-20
14	24	98.6-98.6	82	20

THE INCIDENCE OF CASES AMONG THE 80 WORKERS OF THE DAY SHIFT AT THE PLANT

On the day of the outbreak 20 persons were interviewed at the hospital, and information was obtained concerning the foods eaten. It is interesting to note that in all but two cases this original information was not consistent with the data obtained at a later date.

On August 2, 1943, all of the 74 employees of the day shift, who were present at the plant, were interviewed. The data obtained included information concerning the foods eaten, particular symptoms, time of onset of attack, time of eating, and facts of illness.

the salad, but were exposed to the raw milk.

Inquiry also revealed (see Table 4) that among 70 persons exposed to the 10 A.M. foods, 47 persons or 67 percent became ill. Among the 63 persons exposed to the noon meal foods, 50 individuals or 79 percent became ill. It was also learned that among the 57 persons exposed to the 3 P.M. foods, 36 or 63 percent became ill. Further study of Table 4 discloses that among 73 persons exposed to raw milk drinks, 50 persons or 68 percent became ill, and among the 55 persons exposed to potato salad, 49 individuals or 89 percent became ill.

TABLE 4
ATTACK RATE AMONG EMPLOYEES OF PLANT

	Total	Became ill	Were not ill	Percent ill	Percent not ill
Persons ate at 10 A.M.....	70	47	23	67+	33—
Persons ate at 12 noon.....	63	50	13	79+	21—
Persons ate at 3 P.M.....	57	36	21	63+	37—
Persons who had drinks containing raw milk.....	73	50	23	68.4+	31.6—
Persons who ate hamburg.....	56	45	11	81.4+	18.6—
Persons who ate potato salad					
Note: (Lettuce and tomato part of salad).....	55	49	6	89%	11%
Persons who <i>did not</i> eat potato salad...	9	2	7	23—%	77%
Persons who <i>did not</i> have drinks containing raw milk.....	4	4	0	100%	0%
Persons who <i>did not</i> eat 12 o'clock meal	10	0	10	0%	100%

THE SOURCE OF THE INFECTING ORGANISMS

The epidemiological and clinical data support the theory that the illness probably was caused by an enterotoxin of *Staphylococcus* origin in the incriminating foods. These were milk drinks containing raw milk and/or potato salad.

Examination of the hands of the three food handlers revealed no evidence of skin infection or other localized infection. Inspection of the cafeteria disclosed that the kitchen was in good sanitary condition, that the foods used were fresh and obtained from reliable sources, except the raw milk supply which was being dispensed at the cafeteria in violation of a local pasteurization regulation, and that the refrigeration and storage of the foods were adequate. The raw milk supply was obtained from two farms located in another town. Both of these farms were found to be in an insanitary condition. The refrigeration and care of the milk at both farms were inadequate. These farms were never recorded with the local Health Department and therefore were never inspected until the time of the outbreak.

Throat cultures were obtained, during the investigation, from the three food handlers and the four persons handling the raw milk supply. *Staphylococci* were found to be present in the

throats of one of the milkers at each farm. There were no apparent suspicious illnesses among the persons at either farm or among the food handlers.

The seven cows which were supplying the plant cafeteria with milk were examined by a state veterinarian, and milk samples were obtained from each.

Bacteriological and chemical examination of the foods involved in the outbreak were made. *Staphylococci* were not found in the cultures from the hamburger steak, mayonnaise, butter, and cake. The organisms were found in the cultures from the drinks containing raw milk and the potato salad. The milk from four quarters of six cows showed the presence of *Staphylococci*, and the milk from the seventh cow tested showed *Staphylococci* present in one quarter.

The chemical analysis of the milk showed no arsenic, antimony, mercury, or fluorides present in the food.

Two water samples taken in the factory proved to be free from bacteria characteristic of pollution.

Although it was impossible to determine the exact food causing the outbreak, it became apparent that there was probably a definite link between the heavily contaminated raw milk and the potato salad which also carried the causative organisms. Consequently, this point was investigated. It was disclosed that there were at least two common vehicles by which this par-

ticular milk could have contaminated the potato salad. It was found that, during the morning of the outbreak, a long-handled spoon was used to stir the raw milk and was subsequently used, without washing, to mix the salad. Another significant fact was that a strainer was used to strain clumps from the raw milk, and this utensil was used later, without washing, to strain parsley which was used

as an ingredient in the potato salad. The data were definitely substantiated by the chef himself. However, because of the lack of significant laboratory findings for *Staphylococci* in the specimens of the milk and potato salad, it is impossible to reach a definite, satisfactory conclusion in regard to naming either the potato salad or the milk as the exact food responsible for the outbreak, nor can it be definitely ascer-

TABLE 5

RESUME OF THE LABORATORY RESULTS OF THE SPECIMENS OF FOOD INVOLVED IN THE OUTBREAK

Raw milk sample	2 strains of <i>Staphylococcus aureus</i> , one which fermented lactose and mannite and produced coagulase. The other fermented lactose but did not produce coagulase.
	Negative for paratyphoid group.
Standard Plate Count of Raw Milk per ml.	Count over one million.
Potato Salad	A <i>Staphylococcus aureus</i> which fermented lactose but not mannite and did not produce coagulase.
Coffee Milk	A <i>Staphylococcus aureus</i> which fermented lactose and mannite but did not produce coagulase.
Milk (direct from cows).....	} <i>Staphylococcus aureus</i> of five cultural varieties.
333377 (4 quarters).....	
521 (4 quarters).....	
649928 (LR, RR and LF).....	
D-45387 (RF and RR).....	
129038-B (RR).....	
C-22269 (RR, LR, RF and LF).....	} <i>Staphylococcus albus</i> .
655366 (RF, LF, LR, RR).....	
Milk (direct from cows).....	
D-45387 (LF and LR).....	} <i>Staphylococcus albus</i> .
129038-B (RR).....	
649928 (RF).....	
Hamburg.....	} No <i>Staphylococci</i> or paratyphoid group.
Apple Turnover.....	
Blueberry Muffin.....	
Cookies.....	
Brownie.....	} No <i>Staphylococci</i> .
Milk 129038-B (4 quarters).....	
Cream (Holstein).....	
Butter (Jar).....	
Butter, Pat.....	} No <i>Staphylococci</i> or paratyphoid group.
Mayonnaise.....	
Water.....	Two samples—no bacteria characteristic of pollution.
Food.....	Chemical analysis showed no arsenic, antimony, mercury or fluorides present.
Throat Cultures.....	<i>Staphylococci</i> were found in the cultures from the throats of a milker at each farm.

tained that the milk was the contaminating agent.

CONCLUSION

Although evidence is not conclusive, the probability that the raw milk was the incriminating food in this particular outbreak cannot be ignored. With this idea in mind, it is needless to say that the finger of suspicion points to the possibility that once again raw milk was the primary factor in another outbreak of illness which might have been

prevented if properly pasteurized milk had been used in accordance with the requirements of the local milk pasteurization regulation.

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