EPA-600/9-79-001
June 1979

WATERBORNE TRANSMISSION OF GIARDIASIS

Proceedings of a Symposium

September 18-20, 1978

Sponsored by the
Health Effects Research Laboratory
and the
Municipal Environmental Research Laboratory

Edited By
W. Jakubowski and J. C. Hoff

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL RESEARCH CENTER
CINCINNATI, OHIO 45268

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An Outbreak of Gastroenteritis Associated with *Giardia Lamblia**

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There is still controversy concerning the pathogenicity of the intestinal flagellate, *Giardia lamblia.* For many years it was generally considered a harmless commensal, because of its presence in many healthy individuals and its lack of tissue invasiveness. Experimental infection of human volunteers resulted in transitory changes in stool pattern in some of the subjects, but not in clinical illness (1). There have been, however, numerous reports of cases of intestinal disturbances associated with the presence of *Giardia,* and without any other detectable cause (2-4). The relief of symptoms in many of these patients after eliminating the giardias with quinacrine has greatly strengthened the case for the pathogenicity of the parasite (5-8).

The manifestations of *Giardia* infection are believed to be due to chronic irritation of the duodenum resulting from the attachment of enormous numbers of trophozoites to the surface of the mucosa (9). The most common symptoms are diarrhea, flatulence and upper abdominal discomfort (3,5,6,8). Steatorrhea is often noted, especially in children (9), who tend to have both a higher carrier rate and a higher rate of symptomatic infection than do adults. The disease is usually sporadic in incidence, though one outbreak involving 44 persons, over half of them children, was reported in England in 1942 (10).

The present report gives the results of an investigation made during an outbreak of gastroenteritis which occurred in Portland, Oregon during the fall and winter of 1954-55. The source, mode of spread, and nature of the etiological agent were never satisfactorily determined. A striking increase in the incidence of *Giardia* in the population at the time of the outbreak and its correlation with cases of diarrheal disease are considered worthy of note, especially since no published reports of similar epidemics could be found.

EPIDEMIOLOGY AND CLINICAL ASPECTS

The outbreak began in October, 1954 and continued until March, 1955, reaching a peak in late December and early January. The Oregon State

*This paper was not presented but has been included in the Proceedings at the request of the editors. The manuscript was prepared about 1959 but never published.

Board of Health estimated that at least 50,000 cases occurred during that period. The outbreak appeared at the time to be confined to Portland and the surrounding suburban communities, though later reports made it seem probable that similar outbreaks occurred elsewhere in the state. Age, sex, place of residence or work within the city seemed to play no role in the distribution of cases, except that relatively more cases occurred among adults than among children.

The outbreak was unique in the experience of the city, both in the numbers of people involved and in the character and duration of symptoms. In 500 cases investigated by the epidemiologists, the average duration was 14.8 days, with an extreme range of 1 to 120 days. A third of the cases were of the chronic, intermittent type. Abdominal discomfort, diarrhea, loss of appetite and nausea were the most frequent symptoms. From histories obtained during the course of our investigation, it appeared that a typical individual experience was a series of episodes of diarrhea, occurring at intervals over a period of several weeks. The stools during the acute attacks often were watery, pale and fatty, containing no blood or pus. Though the acute episodes of diarrhea often lasted only a few days at a time, the discomfort, especially in the upper abdomen, the nausea and lack of appetite often persisted between attacks. Most of those affected were able to continue their usual activities; however, those afflicted more severely required hospitalization for uncontrollable diarrhea and marked weight loss.

Neither preceding nor during the outbreak was there any reported increase in the number of infections with salmonella, shigella or amebae. A marked increase in the incidence of *Giardia* found in fecal specimens from patients with diarrhea, especially in those specimens which were liquid, pale and fatty in appearance, was noted by some of the clinical laboratories in October. As the possibility of a relationship between the presence of the flagellate and the current syndrome became known, many physicians began to use quinacrine in treatment. Many of them reported excellent results, with marked improvement in symptoms within 24 to 48 hours, even in cases which previously had been treated unsuccessfully with a variety of other drugs. Others reported equally good results with other methods of treatment. Unfortunately, the number of reports containing parasitological data was too small for any statistical analysis by the epidemiologists. Physicians frequently prescribed quinacrine only on the basis of symptoms, without ordering a stool examination. The lack of clear-cut evidence led the State Board of Health to conclude that the outbreak was caused most likely by an unidentified virus, but the unusual prevalence of *Giardia lamblia* cysts in stools of patients seemed worthy of record.

Because of the strong public interest in the outbreak, the differences of opinion among members of the medical profession concerning the significance of *Giardia* in relation to the disease, and the difficulty of obtaining adequate data, an investigation was conducted among a group of people from whom reasonably complete records could be obtained. The study was initiated in January, 1955, at a time when the outbreak was declining.

PROCEDURES

The group chosen for the survey consisted of 81 persons, 68 men and 13 women, all of them students or employees of the Medical School. Twenty-nine other individuals were also studied, but not included in the survey group. Most of them were students or employees who were suffering from gastroenteritis, and the others were members of the families of those found to be harboring *Giardia*.

Each member of the survey group submitted up to 3 stool specimens for examination, unless *Giardia* was found in one of the specimens. Those found to be harboring the parasite were not required to submit further specimens. The number of examinations performed on the patient-contact group varied widely, but usually consisted of only 1 specimen. A few patients, in all of whom *Giardia* had been found on the first examination, submitted several specimens over a period of weeks. Each person examined filled out a questionnaire, stating whether he had had a gastrointestinal disturbance of any kind during the preceding 6 months, the nature of the symptoms, duration, type of treatment, and the results of previous stool examinations.

Fresh, unpreserved specimens were used, and all were examined in iodine-stained wet mounts after concentration by the formalin-ether technic. Those specimens which were of softer than normal consistency were examined in saline and iodine mounts before concentration. All soft specimens, as well as those found to contain *Giardia* and all those from individuals with a history of present or recent gastrointestinal illness, were also examined for bacterial enteric pathogens and the serological 0 group of 10 *Escherichia coli* colonies was determined. Iron hematoxylin stains were made from 20 of the specimens which contained large numbers of *Giardia*.

RESULTS

The bacteriological studies revealed no enteric pathogens, and no pattern of *E. coli* grouping appeared. The incidence of intestinal protozoa other than *Giardia* did not differ from that found in similar groups in the past.

Of the survey group, 37% (30 of 81) were found to be harboring *Giardia*. Forty-two percent of the survey group gave a history of a gastrointestinal disturbance within the previous 6 months, and 21% were having symptoms of diarrhea, flatulence, abdominal pain or discomfort at the time the examinations were made. Since no significant difference was found in the number of positive results in those without symptoms and those who had recovered from previous symptoms before the examination was made, only those who were symptomatic at the time of examination will be considered separately. Table 1 shows the comparative incidence of *Giardia* in the two groups. Included for comparison are the results obtained from 112 students and employees examined at other times. Fifty of these 112 persons were studied prior to the epidemic year, most of them having had 5 specimens examined. The remainder were students in the class following the one examined during the outbreak and were studied at the same time the following year. Procedures for the examination of specimens were the same for all groups.

Table 1. Comparative incidence of Giardia lamblia *during epidemic and non-epidemic periods.*

	Epidemic period			Non-epidemic period		
	Gastro-intestinal symptoms present	Gastro-intestinal symptoms absent	Total	Gastro-intestinal symptoms present	Gastro-intestinal symptoms absent	Total
Giardia +	15	15	30	0	8	8
Giardia -	2	49	51	2	102	104
Total	17	64	81	2	110	112

Statistical analysis of the results showed that, in spite of the fact that only half of those harboring *Giardia* were having symptoms during non-epidemic periods, a highly significant association existed between the presence of *Giardia* and symptoms during the epidemic period. The Chi square for the association was 21.5, as compared with an expected 3.184 for a chance probability of 0.05.

All but 5 of the 29 persons in the patient-contact group were having symptoms at the time of examination. *Giardia* was found in 2 of the 5 normal persons and in 16 of the 24 patients. Those with negative findings were examined only once. Since one of the characteristics of the outbreak was the chronicity of the symptoms and since several of those with symptoms were examined during or immediately after a short, acute attack of diarrhea which subsided spontaneously within a day or two, a comparison was made of all those who had symptoms, both among the survey group and the patients, based on the duration of illness. To simplify the analysis, an arbitrary division was made based on duration of more or less than one week. The results are shown in Table 2.

Of the 3 people in the "chronic" series who were negative, 1 was a baby whose diarrhea followed a series of immunizing injections, and a second was an adult who developed diarrhea after intensive antibiotic therapy for an infection. None of the 3 was examined more than once. All of the people who were having symptoms characteristic of the outbreak, and from whom at least 3 specimens were obtained, were found to be excreting *Giardia,* usually in enormous numbers. Twelve of them received quinacrine after the parasites were found and all reported prompt and complete relief of their symptoms, which in some of the cases had been present for 2 months. At

Table 2. Relation between duration of symptoms and presence of Giardia *in 41 cases of gastroenteritis*

Duration of symptoms	No. of persons	No. positive for *Giardia*	% positive
More than 1 week	31	28	90
Less than 1 week	10	3	30

least 7 of the 12 relapsed shortly after discontinuing therapy. In 2 of those, the only ones that were studied adequately, the flagellates were not demonstrable during the symptom-free period, but were found in large numbers during relapses. Two others, who were not examined again, reported relapses and responded promptly to quinacrine treatment.

The characteristics of the onset of symptoms were reported in 26 of the 28 chronic cases in which parasites were found. In only one of these was the onset described as abrupt. The 25 others described onset as gradual or insidious, with symptoms increasing in severity over a period of days or weeks, or as maintaining from the beginning a fairly uniform, low-grade course.

Only 14 people in the entire series were examined within 5 days of onset of their first symptoms. Half of them were negative for *Giardia*. Two of these patients were babies with mild to moderate diarrhea. Three of the adults had attacks lasting only a few hours, with nausea and vomiting as prominent symptoms. The others had attacks lasting 2 to 3 days. In all, symptoms subsided without specific treatment and without known recurrences.

Three of the 7 patients with *Giardia* also had brief attacks, without specific therapy or known recurrences, though 2 were still excreting the parasites when re-examined a month later. The other 4 had a more prolonged course. One recovered spontaneously after 9 days, though his stools still contained *Giardia* on re-examination 6 weeks after recovery. Two had typical severe, chronic cases, which responded promptly when quinacrine was finally administered, but both later had at least 2 relapses. The fourth experienced mild symptoms of abdominal discomfort and soft stools for at least a week following a severe attack of diarrhea, but was not examined again.

In none of our cases was it possible to demonstrate to our complete satisfaction that the patient was parasite-free until the onset of symptoms, and developed chronic disease with the establishment of *Giardia* infection. The patient who most nearly fulfilled the requirements had undergone numerous parasitological examinations in the past, none of them positive, and had large numbers of *Giardia* on the first examination following the onset of symptoms. The disease in this case was typical in the nature of symptoms, long duration and response to therapy. The last negative examination, however, had been made several months before the attack. Another reported having had slight diarrhea and minor malaise during the second week in January, the symptoms subsiding without treatment. Three stool specimens, examined between January 24 and February 2, were negative for *Giardia*. Diarrhea and intestinal discomfort reappeared on March 4, after a course of sulfonamides for a sinus infection. A stool specimen examined on March 9, while the diarrhea was still severe, contained enormous numbers of *Giardia*. The symptoms ceased within 24 hours after the administration of quinacrine. Both of these cases strongly suggest the association between the parasites and the diarrheal attacks, but neither provides proof of the association.

DISCUSSION

The results of this investigation, and a comparison of these results with those of other periods, make it clear that there was an entirely abnormal incidence of *Giardia* infection in the group studied at the time of the outbreak. The flagellate was found in 44% of those studied during the outbreak, in contrast to 7% of those examined during non-epidemic periods. Even if only those who gave no history of present or past intestinal disturbance are considered, the rate of infection was 24%, or over 3 times that of the control figure.

It is apparent that the presence of the parasite did not necessarily result in disease, since half of those infected were asymptomatic. This is in accordance with the observations of other workers (3). The role of *Giardia* in the transitory cases, either mild or acute, is difficult to assess, because of the small numbers which were studied and the high carrier rate that existed at the time of the study. Undoubtedly many, and very possibly all, of the acute, brief episodes of vomiting and diarrhea were due to other causes, since they were similar in symptomatology and course to cases which occur sporadically every winter. It does not appear from our data that *Giardia* played any role of consequence in these. Its association with the several mild cases of transitory abdominal discomfort and a few unwontedly soft stools is also undetermined, especially since its continued presence did not lead to continued symptoms.

The high rate of repeated relapses among the quinacrine-treated cases is contrary to the usual experience, and to the experience here with cases which have occurred sporadically since the outbreak. It is quite possible that the apparent relapses were actually reinfections, the people acquiring them being highly susceptible and the possibilities for reinfection being extremely great at the time.

We feel that our results do give support to the belief that *Giardia* was responsible for the chronic syndrome which was the outstanding feature of the outbreak. This belief is based on the constant presence of the parasites in those suffering from this syndrome, the uniformity of their symptoms, the favorable effect of quinacrine, and the similarity of the symptoms to those described by others as characteristic of giardiasis. The infrequency with which acute attacks were recorded as preceding or initiating the symptoms in the chronic cases suggest that the enhanced pathogenicity of the parasite in these cases was not due to the action of another acute infection in preparing the way for its establishment and unrestrained multiplication. We have no adequate explanation for the extreme variability in the results of *Giardia* infection in different individuals, nor for the circumstances which led to its exceptional prevalence during this period. We doubt, however, that the experience here was unique, and suggest that giardiasis be more seriously considered than it usually is both in sporadic cases in adults and in outbreaks in which the symptomatology is similar to that described here.

SUMMARY

An outbreak of gastroenteritis, characterized by the exceptionally prolonged course of many of the cases, is described. A survey made during the outbreak revealed that only *Giardia lamblia,* of the known possible etiological agents of such a syndrome, was detectable in the majority of those affected. The results of the survey are presented and discussed, and the reasons given for the conclusion that the prolonged attacks were probably chiefly due to *Giardia* infection.

(*Editors Note:* Supplementary information developed by the Oregon State Board of Health and supplied by the author follows the References).

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DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

REPORT OF DISEASE OUTBREAK PHS 767

STATE	COUNTY	CITY OR TOWN
OREGON	MULTNOMAH	METROPOLITAN AREA OF PORTLAND, OREGON

TYPE OF DISEASE OUTBREAK	NAME OF COMMUNITY, CAMP, INSTITUTION	POPULATION
GASTROENTERITIS		

PROBABLE MODE OF SPREAD
UNDETERMINED

DATE OF ONSET	INCUBATION PERIOD (Hours or days)
FIRST CASE ABOUT 11/20/54 LAST CASE	UNCERTAIN

NUMBER OF CASES ~~XXXXXXX~~ ESTIMATED	NUMBER OF DEATHS
50,000	

	NUMBER
CASES INVESTIGATED EPIDEMIOLOGICALLY	537
CASES CONFIRMED BY LABORATORY EXAMINATION	-
CASES WHICH CONTACTED A SUSPECTED VEHICLE	-
PERSONS EXPOSED TO A SUSPECTED VEHICLE(1)	-

IF THIS WAS A COMMON SOURCE OUTBREAK INDICATE TYPE OF VEHICLE

[ ] MILK [ ] ICE CREAM [ ] OTHER DAIRY PRODUCT [ ] SHELLFISH [ ] WATER [ ] UNIDENTIFIED [ ] OTHER FOOD (State kind)

HOW WAS VEHICLE INFECTED	IF WATER-BORNE, TYPE OF SUPPLY	KIND OF TREATMENT

IF MILK-BORNE, WAS DAIRY PRODUCT PASTEURIZED?	GRADE	IF SHELLFISH, WAS THERE CONTAMINATION IN
[ ] YES [ ] NO		[ ] NATURAL GROWING AREAS [ ] FLOATS [ ] OTHERWISE

REPORT OF LABORATORY FINDINGS (State type of specimen examined and specific type of organism found)

NAME AND POSITION OF INVESTIGATOR	AGENCY
STAFFS	Portland Bureau of Health, Oregon State Board of Health, Bacteriology Department, U. of Oregon Medical School

NARRATIVE REPORT (Supplementary narrative report is requested for all outbreaks, including clinical symptoms, age distribution of cases if pertinent, etc.)

This is a summary report of the outbreak previously described in a preliminary report dated 1/31/55. While evidence is inconclusive, this is believed to be a contact spread outbreak rather than a common source outbreak. There is now considerable evidence that the syndrome has been noted in other parts of the state and probably out-of-state. While an unidentified virus seems the most likely etiologic agent, the unusual prevalence of *Giardia lamblia* cysts in stools of patients seems worthy of record.

See attached data.

(Use reverse side if necessary)

REPORT APPROVED BY (Name and Title)	DATE
S.B. OSGOOD, M.D., DIRECTOR, EPIDEMIOLOGY SECTION, OREGON STATE BOARD OF HEALTH	2/17/55

(1) If necessary, estimate the probable number. In the case of public water supplies use the percentage of homes connected. In the case of milk supplies use the percentage of the total milk supplies represented by the incriminated supply. In the case of ice cream or food attempt to secure estimate from distributor of total number of customers.

RESULTS OF UNIVERSITY OF OREGON MEDICAL SCHOOL STUDY ON

GASTROENTERITIS OUTBREAK

* *

A. Virus Isolation

No virus isolated from stools of acute cases as of 2/15/55.

B. Enteric Pathogens (Single stool from 100 persons, usual cultural technics).

No enteric pathogens isolated as of 2/2/55.

C. Intestinal Parasites

I. Specimens obtained from 23 patients with acute gastroenteritis, 68 students in one class of medical students and 9 members of bacteriology department staff for a total of 100 cases.

II. Methods

All stools examined by a concentration method for parasites and ova; when initial stool was negative, up to 3 specimens were secured on the same case before any were called negative for *Giardia*.

Histories were obtained from the "survey" group of 77 cases to determine whether or not there was any history of gastrointestinal symptoms during the prior 3 months.

III. Results

A. No *E. histolytica* and very few intestinal parasites other than *Giardia* were found.

B. *Giardia* were found in 15 of 23 (65%) of the "Patient" group and in 25 of 77 (32.5%) of the "survey" group for an overall percentage of 40% positive *Giardia*. This contrasts with less than 3% positive for *Giardia* in a similar but smaller group of medical students examined by the same technic about 1 year ago.

C. Of the 25 in the survey group positive for *Giardia* 16 (64%) had gastrointestinal symptoms (10 prolonged or recurrent and 2 relieved by atabrine) whereas 9 (36%) denied any symptoms and in 4 of these *Giardia* were numerous.

D. *Giardia lamblia* (chiefly cysts) were found in 31 (58%) of the group that had symptoms and in 9 (20%) of the group that had no symptoms.

/dl Epid Section-OSBH
2/17/55

RESULTS OF LABORATORY POLL ON STOOL SPECIMENS EXAMINED FOR PARASITES

* * * * * * * * * * * * * * * * *

Name of Laboratory	OCTOBER 1954			NOVEMBER 1954			DECEMBER 1954			JANUARY 1955		
	No. Spec. Examined	No. *Giardia* +	% *Giardia* +	No. Spec. Examined	No. *Giardia* +	% *Giardia* +	No. Spec. Examined	No. *Giardia* +	% *Giardia* +	No. Spec. Examined	No *Giardia* +	% *Giardia* +
OSBH HYGIENIC LABORATORY	38	2	5.2	14	-	0.0	33	9	27	53	14	26
U. OF O. OUT-PATIENT CLINIC (Dr. Grondahl)	-	-	-	49	1	0.5	57	3	5.3	165	24	14
GOOD SAMARITAN HOSPITAL	-	-	-	16	-	0.0	52	11	22	104	26	25
ST. VINCENTS HOSPITAL	-	-	-	10	2	20	5	3	60	27	1	3.7
PHYSICIAN'S MEDICAL (Dr. Crynes)	-	-	-	-	-	-	30	21	70	-	-	-
DITTEBRANDT LABORATORIES	-	-	-	14	1	7	18	6	33	62	21	33
MANLOVE LAB-ORATORIES	-	-	-	-	-	-	30	1	0.3	14	3	21
JACKSON TOWER (Dr. Minckler)	-	-	-	-	-	-	9	4	44	16	6	37
PROVIDENCE HOSPITAL	-	-	-	15	-	0	30	-	0	-	-	-
TOTAL	38 (1 laboratory reporting)	2	5.2%	118 (7 laboratories)	4	3.4%	264 (9 laboratories)	58	22%	441 (7 laboratories)	95	21.5%

/dl Epid Section-OSBH
2/17/55

RESULTS OF HETEROPHILE ANTIBODY TESTS AND SEROLOGIC TESTS

FOR SYPHILIS ON KNOWN GASTROENTERITIS CASES

* * * * * * * * * * * * * * * * *

A. HETEROPHILE ANTIBODY TESTS

1 case, *Giardia* present, antibody titer 1/80 two weeks after onset and 1/40 three weeks after onset.

B. SEROLOGIC TESTS FOR SYPHILIS

17 cases, *Giardia* known to be present in stools of 11, STS negative on all 17 cases - blood taken 7 to 35 days after onset.

(a few doctors had reported doubtful serologic tests for syphilis and slight reactions to the heterophile antibody test on 1 or 2 cases of the current gastroenteritis syndrome)

/dl 2/17/55

DIARRHEAL ILLNESS

Total Tabulation Including Cases From Private Doctors, OSBH Cases, Plus State Office Building Cases

I. Multiple vs Single Case Households

A. Total Household - 253
B. Single Case Household - 127 (50%)
C. Multiple Case Household - 126 (50%)

II. Duration of Illness

A. Private M.D. Cases (142 cases)
Range - 1 - 120 days
Average - 18 days

B. OSBH (42 cases)
Range - 30 days
Average - 8 days

C. State Office Building (317 cases)
Range - 1 - 90 days
Average - 14.3 days

D. Total (501 cases)
Range - 1 - 120 days
Average - 14.8 days

E. Chronic, intermittent type illness

1. Private M.D. - 52 of 142 cases (36.6%)
2. OSBH - 9 of 42 cases (21.4%)
3. State Office Building - 105 of 317 cases (33.1%)

III. Sex Distinction (537 cases)

A. Male - 217 (40.5%)
B. Female - 320 (59.5%)

IV. Age Distribution (461 cases)

A. Cases

Less than 5 - 27 (5.86%)
5 - 9 - 28 (6.1%)
10 - 14 - 27 (5.86%)
15 - 19 - 23 (5.0%)
20 and over - 356 (77.0%)

(Age distribution of Portland population, 1950 census for comparison)

Under 5 - 9.2%
5 - 9 - 6.8%
10 - 14 - 5.4%
15 - 19 - 5.1%
20 and over - 73.4%

B. Exposures (740 total)

Less than 5 - 85 (11.5%)
5 - 9 - 72 (9.7%)
10 - 14 - 41 (5.5%)
15 - 19 - 44 (5.9%)
20 and over - 498 (67%)

C. Over-all attack rate in exposed household

1. Total exposed - 740
2. Total ill - 461
3. Rate - 62%

D. Age-specific attack rate

Less than 5 - 31.7%
5 - 9 - 39%
10 - 14 - 66%
15 - 19 - 52%
20 and over - 71.5%

V. Symptoms (358 cases)

Loss appetite	- 246	(69%)
Nausea	- 238	(66%)
Vomiting	- 129	(36.0%)
Abdominal discomfort	- 291	(81%)
Diarrhea	- 275	(77%)
Muscle Pain	- 101	(28.3%)
Fever	- 92	(25.7%)
Headache	- 152	(42.5%)
Cough	- 62	(17.3%)
Sore Throat	- 52	(14.5%)
Runny Nose	- 51	(14.6%)

VI. Duration of Illness vs Therapy

I. Atabrine therapy (71 cases)

A. Average duration before treatment - 11.1 days

B. Average duration after treatment - 7.8 days

C. Average duration total illness - 18.9 days

II. Treated by means other than atabrine (103 cases)

A. Average duration before treatment - 5.8 days

B. Average duration after treatment - 9.7 days

C. Average duration total illness - 15.5 days

REPORT ON DIARRHEAL DISEASE IN STATE OFFICE EMPLOYEES

I. Attack rate among employees

A. 561 persons reported on
B. 173 persons ill
C. Attack rate - 30.8%

II. Duration of illness (known on 317 cases)

A. Average duration - 14.3 days
B. Range - 1 to 90 days
C. Chronic relapsing type of illness - 105 cases (33.3%)

III. Multiple vs Single Household cases (182 households)

A. Single Case Household - 95 (52%)
B. Multiple Case Household - 87 (48%)

2 cases - 53
3 cases - 18
4 cases - 14
5 cases - 1

IV. Sex Distribution (323 cases)

A. Male - 132 (41%)
B. Female - 191 (59%)

V. Age Distribution

A. Cases - 319

Less than 5 - 11 (3.45%)
5 - 9 - 13 (4.1%)
10 - 14 - 23 (7.2%)
15 - 19 - 20 (6.3%)
20 and over - 252 (79.0%)

B. Exposures - 485

Less than 5 - 47 (9.7%)
5 - 9 - 33 (6.8%)
10 - 14 - 27 (5.6%)
15 - 19 - 37 (7.6%)
20 and over - 341 (70%)

C. Over-all attack rate in exposed household

1. Total exposed - 485
2. Ill - 319
3. Rate - 66%

D. Age-specific attack rates

Less than 5 - 23.4%
5 - 9 - 39.4%
10 - 14 - 85%
15 - 19 - 54%
20 and over - 74%

VI. Treatment (known on 184 cases)

A. Non-specific (none, Pepto Bismol, etc.) - 108 (58.6%)

B. Bismuth and Paregoric 10

C. Kaopectate 22 } 37 (20%)

D. Antispasmodics 5

E. "Specific" therapy 40 (21.7%)

Aureomycin - 3
Creomycin - 2
Penicillin - 7
Terramycin - 2
Streptomycin - 1
Ilotycin - 1
Dramamine - 1
Sulfa - 1
Antihistamine - 3
Atabrine - 6
Unknown prescription - 13

VII. Symptoms (174 cases)

Loss of appetite - 119 (68%)
Nausea - 122 (70%)
Vomiting - 58 (33%)
Abdominal Discomfort - 154 (88.5%)
Diarrhea - 131 (75%)
Muscle Pain - 67 (38.5%)
Fever - 63 (36%)
Headache - 112 (64.4%)
Cough - 35 (20%)
Sore Throat - 45 (26%)
Runny Nose - 43 (24.7%)

February 16, 1955

ABSENTEEISM DATA IN RELATION TO PORTLAND GASTROENTERITIS OUTBREAK

I. City of Portland (Municipal employees, 3604 employed as of 1/1/55, absentees visited by public health nurses)

Year	Month	Total Absenteeism	Absenteeism due to "flu" and "diarrhea"
1953	November	667	187
1954	November	561	161
1953	December	664	142
1954	December	750	241
1954	January	616	145
1955	January	870	476 (1st as 159 "flu", 317 "diarrhea")
1955	February (1st 2 weeks)	355	83 (37 "flu", 46 "diarrhea")

II. Portland Public Schools--Days Absent, all causes

Year	Month	Absenteeism in pupil days
1953	November	88,951
1954	November	70,622
1953	December	95,074
1954	December	83,295
1954	January	
1955	January	

III. Portland General Electric Company--Absenteeism all causes

Year	Month	Man days lost	Month	Man days lost	Month	Man days lost	Month	Man days lost
1953	Oct.	192	Nov	204	Dec	227	Jan.	194
1954	Oct	200	Nov	221	Dec	266	Jan.	277
1955							Jan	318

(December 1954, 119 specified as "flu" and 3 as "enteritis", January 1955, 139 "flu" and 7 as "enteritis)

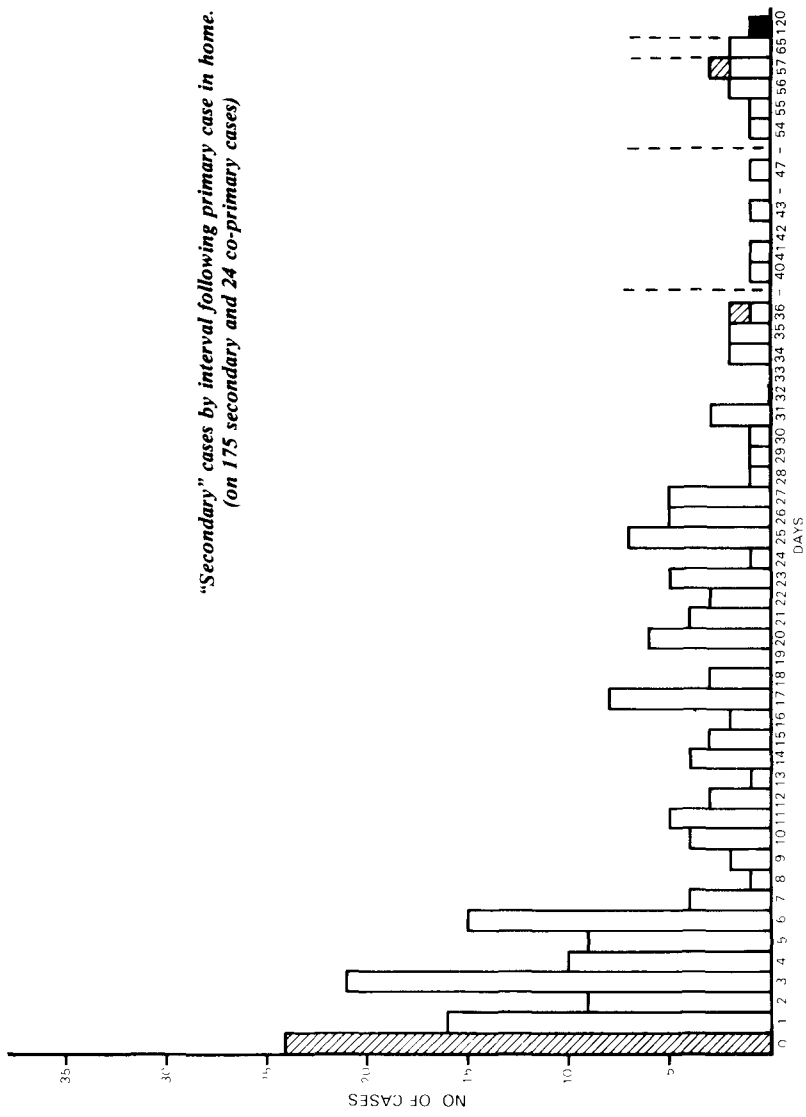
IV Portland Gas and Coke--Absenteeism in Man Hours

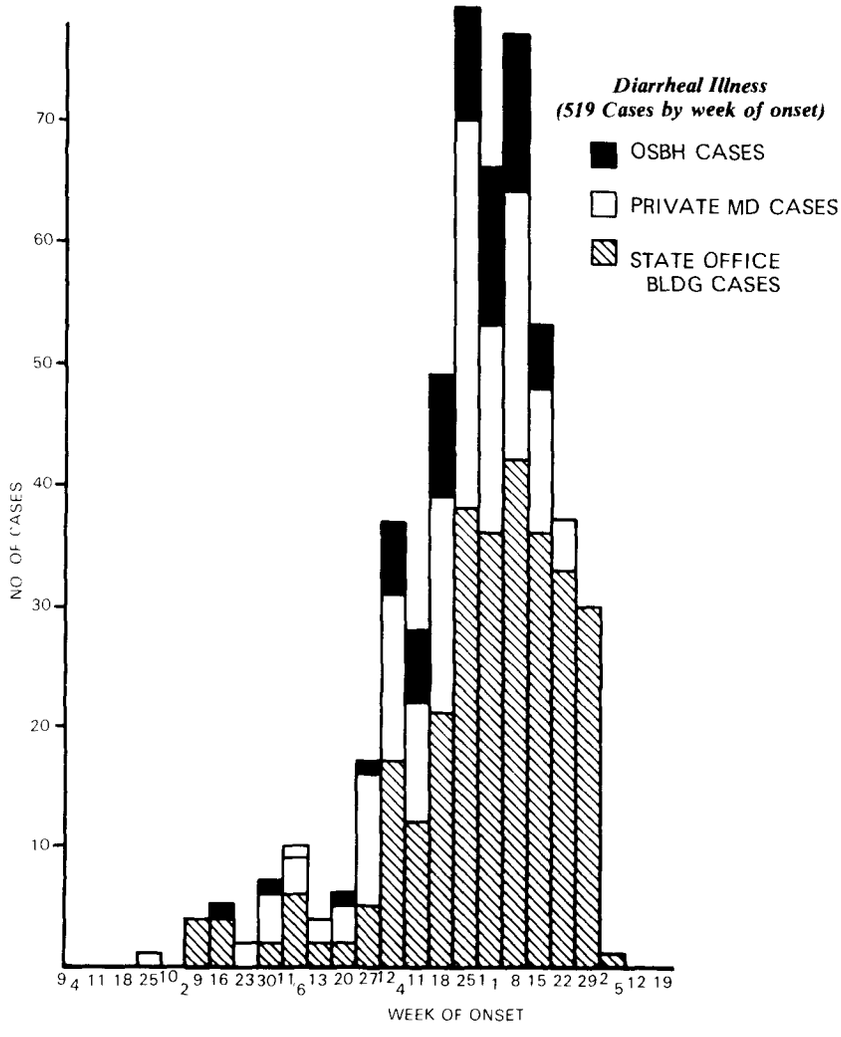
Year	Month	Man hrs. lost	Month	Man hrs. lost	Month	Man hrs. lost	Month	Man hrs. lost
(919 employed) 1953	Oct.	1944	Nov.	3841	Dec.	3748	Jan.	2488
(818 employed) 1954	Oct	2585	Nov	2972	Dec	3504	Jan.	3064
1955							Jan	2976

V. National Biscuit Company--Absenteeism, all causes (Year of 1954 - 2.64%)

1954 January 2 61% December 1.96%
1955 January 1st week 2.46%, 2nd week 2.45%, 3rd week 2.65%, 4th week 2.76%

/dl Epid Section-OSBH
2/17/55


"Secondary" cases by interval following primary case in home.
(on 175 secondary and 24 co-primary cases)
NO. OF CASES
DAYS
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 - 40 41 42 43 - 47 - 54 55 56 57 65 120


Diarrheal Illness
(519 Cases by week of onset)
OSBH CASES
PRIVATE MD CASES
STATE OFFICE BLDG CASES
NO OF CASES
70
60
50
40
30
20
10
9 4 11 18 25 10 2 9 16 23 30 11 6 13 20 27 12 4 11 18 25 1 1 8 15 22 29 2 5 12 19
WEEK OF ONSET