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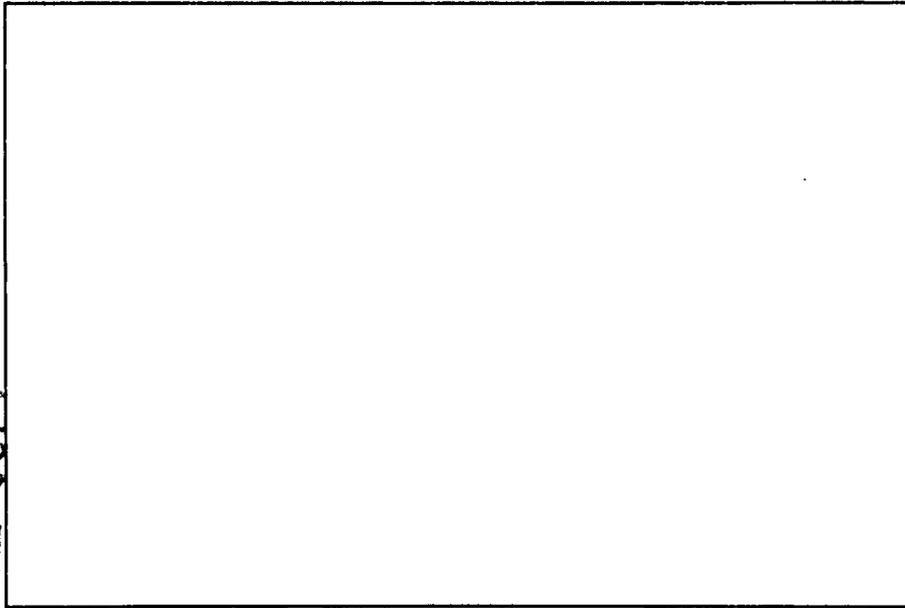
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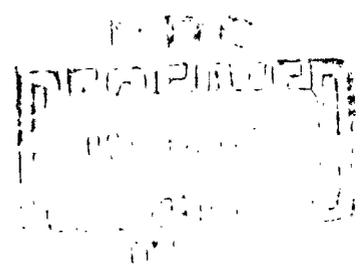
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TASK SURPRISE, - ~~FINAL REPORT~~

PROJECT SUMMIT,

A Study of an Epidemic of Staphylococcal
Enterotoxin Food Poisoning,

Contract No. DA 18-064-Cml-2733

10 October 1960

The Institute for Cooperative Research

UNIVERSITY OF PENNSYLVANIA

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**A Study of an Epidemic of Staphylococcal
Enterotoxin Food Poisoning**

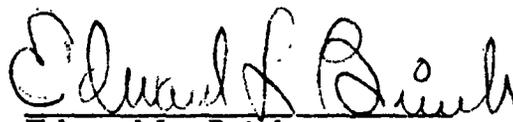
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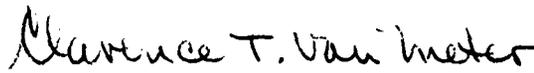
10 October 1960

Approved:



Edward L. Brink
Edward L. Brink
Acting Project Director

Approved:



Clarence T. Van Meter
Clarence T. Van Meter
Assistant Project Director

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PREFACE

Task Surprise represents an investigation into various aspects of a sizeable epidemic of food poisoning caused by staphylococcal enterotoxin.

The final report on the Task consists of two parts. Part One consists essentially of a condensation of facts and conclusions drawn from a larger framework of detailed information which is supplied in Part Two.

Both parts of the final report are published in this single volume which also contains an appendix describing the current state of knowledge of the scientific and technical aspects of the toxin.

A few copies of Part One of the final report were distributed separately in order to guarantee its availability at certain meetings, involving civil defense, which occurred before Part Two could be produced in final form.

INTRODUCTION

On a Saturday afternoon in the middle of summer, an epidemic of staphylococcal enterotoxin food poisoning occurred at a picnic held two miles from Gabriel, a small Midwestern town. (The name of the town and other names in this report are fictitious, in accordance with commitments to Task Surprise respondents.) About 1700 persons attended the picnic, which is an annual affair sponsored by the Johnson Co., of Croydon, some 60 miles away.

Early in the morning, approximately seven hours before the picnic began, an unventilated, unrefrigerated truck containing a large supply of ham sandwiches was parked at the picnic grounds. The truck was exposed to the heat of direct sunlight, while the average ambient temperature for the day was close to 100 degrees Fahrenheit. In this environment, the staphylococcal organisms which elaborate the toxin multiplied rapidly. *

During the epidemic that followed, approximately 1100 persons became ill. The "Morbidity and Mortality Weekly Report" of the U. S. Department of HEW reported that 1183 persons had become ill. It is doubtful that every person who was reported ill received first aid or medical attention. Estimates based on data obtained from hospitals, doctors, clinics and municipal officials indicate that about 1000 persons actually received some sort of assistance.

* There is evidence that the enterotoxin was present in the ham even before the ham was removed from refrigeration and transported to the picnic.

Virtually all picnickers resided in Croydon or its immediate environs, with the exception of a very few relatives of employees of the Johnson Co. Because the site of the picnic was much closer to Gabriel than to Croydon, about 75 percent of the victims, both employees and their guests, were treated in Gabriel. This fact becomes especially significant when it is seen that Croydon has a population of about 35,600 persons while Gabriel has a population of only 6000.

The following are estimates of the number of persons treated in hospitals or similar facilities in various localities: 750 in Gabriel, 130 in Croydon, and 120 at intermediate points between the two towns. Some of the latter were probably not hospitalized.

Project Summit has for some time been engaged in collecting and organizing data on the effects of staphylococcal enterotoxin poisoning in field situations. Prior to the Gabriel food poisoning outbreak such data have been available only from secondary sources; much of it was fragmented, and in many instances it was of questionable reliability. Further, field data from secondary sources did not in most instances deal with individual incapacitation or disruption within communities or organizations whose members had either been exposed to the toxin or whose activities had been influenced by the exposure of others in their environment.

Since it was unlikely that an experiment involving deliberate exposure to the toxin would be undertaken by professional groups, it was concluded that data on effects in the field could only be obtained by investigating accidental exposures. When an epidemic of food poisoning occurred at a summer picnic area near Gabriel, Project Summit was able to study the effects of staphylococcal enterotoxin poisoning in an extremely realistic setting for the first time.

The study was conducted 1 1/2 months after the end of the epidemic by consulting official records and also by interviewing local physicians, civil defense and police officials, hospital and town administrators, victims of the disease, and volunteer workers who took part in the relief activities.

PART ONE - CONDENSATION

I. CHARACTERISTICS OF THE EPIDEMIC

A. Symptomatology

After ingestion of the contaminated ham sandwiches, about 1100 of those attending the picnic became ill. Symptoms of the illness included nausea, uncontrollable vomiting and diarrhea, severe abdominal cramps, dizziness, and shock. Depression, the only observable emotional reaction to the disease, is believed to have affected 50 percent of those who were ill.

B. Incapacitation

While no deaths occurred, all victims were completely incapacitated at the height of the illness when symptoms were most severe. Authorities estimate that about three percent of the ill would have been in danger of death without medical aid. In addition, 15 percent to 20 percent of the victims required special attention to counteract physiological shock.

The afflicted individuals were unable to operate motor vehicles except to apply the brake and stop them. They could not walk without assistance, and were not able to exercise the intellect to solve problems.

When the most severe effects of the illness had passed, the individuals reported a feeling of profound depression with an attendant lack of motivation for any activity other than sleeping or resting. Many individuals said, in retrospect, that they had frighteningly strong wishes to die; and further, said they would have welcomed death.

It is to be expected, therefore, that a large proportion of persons suffering from staphylococcal enterotoxin poisoning would tend not to be able, or desire, to remove themselves from situations in which they might suffer injuries as a result of action taken by an outside agency.

It is believed, nevertheless, that in a potentially dangerous external environment, victims are capable of locomotion with assistance even during the most severe stages of the illness. Such movement would, however, be extremely slow and of short duration.

C. Age and Health Factors

Although the ages of the individuals afflicted ranged from infancy to 80 years, no information obtained suggests that systematic difference in the type or severity of symptoms was either attributable to age or related to it. Further, no fatalities or injurious side effects were reported, despite the fact that the

victims represented a heterogenous population in regard to both their ages and states of health.

D. Panic and Other Emotional Reactions

Depression was the only emotional effect produced by the illness. No panic or other untoward emotional reaction was observed in any individual, except for the person who had been in charge of supplying the food. This general lack of emotionality is partly due to the rapid relief actions of the civil defense and partly to reassurances given to well relatives about the non-fatal character of the disease.

E. Onset Time

The onset of the illness occurred about two to five hours after ingestion of the contaminated food for 70 percent of the victims. The onset peak occurred during the third hour, during which 30 percent of all illnesses began. Seven percent of the individuals became ill in the first hour and 19 percent in the sixth and seventh hours.

Once the symptoms appeared, the illness developed very rapidly (within five minutes or less) into a severe form. Individuals would feel perfectly well one minute but would be violently ill

the next. Persons becoming ill had very little, if any, warning regarding the onset of the illness because of the lack of premonitory symptoms.

F. Duration

The duration of the illness ranged between eight hours and 16 hours for 70 percent of all illnesses. Most of the remaining 30 percent of the illnesses were of shorter duration, lasting from two to eight hours. A few persons were ill for 24 hours or longer.

G. Treatment

Treatment was entirely symptomatic. The kinds of oral medications employed included anti-emetics, anti-diarrheics, gastrointestinal anti-spasmodics, sedatives, and tranquilizers. Specifically, the most frequently used medications were Paregoric, Kaopectate, Dramamine, and Phenergan. Two hospitals exhausted their Dramamine supplies early; they made no attempt at replacement, and instead switched to Phenergan. Patients suffering from shock were given intravenous glucose or saline solutions. Some were also given intravenous Adrenaline to stimulate the cardio-vascular system.

II. THE EMERGENCY SITUATION

A. Traffic Congestion

Shortly after several members became ill, the picnic was disbanded and the members were directed to return to their homes. Virtually all those attending the picnic lived approximately 60 miles away in Croydon. As a result of the rapid exacerbation of the disease, many people driving away from the picnic grounds were forced to halt their vehicles in midroad. The congestion of cars created a potential traffic hazard which would have been very marked if the roads were heavily travelled, as would have been the case near an urban area. In all known cases the driver was able to exercise sufficient self control to stop the vehicle, and no automobile accidents resulted. However, many cars were not pulled off the road; nor were engines stopped or doors closed.

B. Civil Defense Activities

By 2:00 P. M. Saturday, a sufficient number of ill persons had arrived in Gabriel to indicate widespread illness. The Gabriel community, which has a population of 6000, had effectively organized all of its relief measures within 1 1/2 hours after the

first patients arrived from the picnic grounds two miles west at Park Ridge.

When it was initially determined that large numbers of people were becoming ill, Gabriel's mayor turned the whole matter over to the civil defense director, in accordance with a previous informal agreement. The mayor placed all town agencies, including the police and fire departments, under civil defense control.

The following relief measures were taken within the first 1 1/2 hours:

- (1) A CD control center with a two-way radio and tele-phones was in operation.
- (2) The town armory had been readied to receive several hundred patients.
- (3) All medical personnel and the two hospitals had been alerted.
- (4) Traffic controls were established at all points where congestion or confusion would have been likely.
- (5) Measures were taken to protect abandoned property, which consisted mainly of cars.
- (6) Arrangements were made to register victims.

Within an hour of the arrival of the first patients at the armory, beds, mattresses, blankets, medical supplies, and

other essential items had been supplied. Later on the same day, the well relatives of the ill were housed and food was provided for all. Emergency floodlighting was set up to illuminate the armory and approaches to the hospitals.

The amounts of vomitus and fecal matter which accumulated in the armory and the hospitals were so large that the easiest way to dispose of them was by burial, and this required the services of special disposal squads equipped with shovels and bulldozers.

On Sunday the epidemic no longer constituted an emergency situation. However, county school buses were used to take home many individuals who still did not feel strong enough to drive or had become separated from the persons who initially drove them to the picnic. Transportation was also arranged for persons wishing to pick up stranded vehicles.

Troublesome problems arose in the handling of patients during the emergency situation. Most prominent among these were:

- (1) The registration system operated on a hit or miss basis because of the heavy patient influx and the serious condition of many patients.

(2) Treatment schedules became confused because of a general shortage of patient identification tags. Some persons received duplicate treatments and others received none. Treatment schedules were further complicated by transfers of patients from one facility to another.

C. Communications

Local radio and television stations carried the news of the epidemic within an hour of its occurrence and gave it very complete coverage. The local stations made reassuring statements about the benign character of the disease and gave helpful hints for first aid treatment.

Civil defense communications, especially those depending on radio, were seriously hampered by the lack of an adequate message priority system. The registration difficulties referred to under (B) above also caused inefficiency in radio communications since relatives kept trying to locate each other by CD radio.

III. FINANCIAL AND MANPOWER COSTS

A rough and ready way to obtain an index of the energy demanded in coping with an epidemic of this sort is to compute the costs in terms of required manpower and money. Sufficient information along these lines may permit estimates of the degree of community incapacitation and disruption caused by staphylococcal enterotoxin. Naturally, differences in the preparedness and size of the community to which one extrapolates must be considered.

Costs for the Gabriel epidemic are estimated to have been 25 dollars per ill individual with 70 percent being spent for medical purposes. This estimate does not include such items as hospital plant maintenance. The estimate does, however, take into account medicines, bedding and other materials; automobile fuel and depreciation are computed on a ten cents per mile basis; also included are fees and salaries for all services. Persons, other than well companions of the ill, who donated their services are included at a rate of pay that would have been normal for the type of service rendered.

About 5000 man-hours were invested in all phases of aid or five man-hours per ill individual. Seventy-eight percent of this total was accounted for by medical nursing and first aid activities.

The estimate does not include such aid as may have been rendered by family members or friends of the victims.

During the active treatment phase a doctor-patient ratio of about 1:70 obtained, while the ratio of registered nurses to patients was estimated at 1:35. Most medical and non-medical persons worked for an estimated 12 consecutive hours, although shifts were set up among many of the relief workers.

Physicians interviewed indicated that the 1:70 doctor-patient ratio was very close to the limits beyond which it would have been impossible to render acceptable emergency service to all patients. However most of the physicians felt that the ratio could have been slightly enlarged if the treatment plans could have been better organized and if more as well as better equipped physical facilities had been available. Several cited an Army field hospital setup as being ideal for such operations.

IV. CONCLUSIONS ABOUT COMMUNITY REACTIONS

It must be born in mind that all victims of the epidemic were from out of town, and that none of the Gabriel inhabitants were ill. It is extremely doubtful that Gabriel could have handled the emergency as efficiently and expeditiously as it did if the inhabitants of Gabriel had been victims of the poisoning. For this reason, then, this study is not a measure of how well Gabriel was organized to take care of itself, but a measure of how well an unaffected community can aid an affected community. This is likely to be an important consideration in estimating the capacity of an affected community to resist and recover from sudden and widespread illness.

The dispatch with which Gabriel handled the emergency can be attributed largely to its CD organization and its director, an able, energetic, and devoted individual. Although no detailed plan had ever been worked out to handle this type of emergency, Gabriel CD is organized in such a way that each of its 125 members knows generally what his duties and responsibilities are in any kind of emergency. An agreement had been reached with the mayor and other town officials to coordinate CD and town facilities to handle emergencies. As soon as the existence of the emergency was realized the CD director took over the direction of all town

facilities. In addition there probably were some general benefits of transfer of training which accrued to the CD unit from its ten previous training exercises, which included both simulated disasters and more paper exercises.

Less information is available regarding the manner in which Croydon coped with the emergency situation. Croydon, which has a population of 35,600 persons, handled only 130 hospital cases. However, the proportional amount of disorganization produced by these cases seems to be greater than that caused by the influx of 750 patients in Gabriel, which has a population of only 6000.

It is quite possible that a larger community, for example, Croydon, would find it more difficult to develop a central coordinating authority because its administrative organization has intrinsic to it more relatively autonomous positions of authority and vested interests which offer potentially greater resistance to coordinating efforts. Another explanation of the apparently less expeditious handling of the emergency situation in Croydon might be that the stress placed on community facilities may not have been great enough to force central coordination on the community as a matter of necessity.

V. EXTRAPOLATION TO MILITARY SITUATIONS

The purpose of Task Surprise ended with the assay of the Gabriel incident. Extrapolation to expectable results if staphylococcal enterotoxin were employed as an agent in various types of military situations was not part of the Task.

Quite obviously, the hazards involved in any such extrapolation would be many and severe. However, the detailed data on the Gabriel episode should prove highly informative to persons experienced in military and civil defense operations who may need to produce such projections.

PART TWO - DETAILED INFORMATION

I. CHARACTERISTICS OF THE EPIDEMIC

A. Agent Identification

In many reported food poisoning epidemics, identification of the toxic substance has been uncertain. In the epidemic to be described here, staphylococcal enterotoxin has been positively identified as the causative agent of food poisoning.

The State Health Commissioner reported that "a filtrate prepared from a culture of staphylococcus isolated from ham (in the sandwiches served at the picnic) was injected into four cats and caused vomiting within thirty minutes to three hours in all four. This is the characteristic response of adult cats injected with known enterotoxin filtrates."

In the "Morbidity and Mortality Weekly Report" the commissioner is quoted as stating that "laboratory examination of specimens of ham indicated extensive contamination with coagulase-positive staphylococci. Findings in other foods served were not significant. The staphylococcus isolated was phage type 6/47/53/VA 4. Stool and vomitus specimens were not obtained, and throat swabs from food handlers at the bakery where the picnic food was prepared were unsatisfactory."

A report from the Johnson Co. bears out the findings of the State Department of Health. The report indicated that virtually all of those persons who reported being ill also said that they had eaten ham. Only two to four percent of those who were ill stated that they had not eaten ham; these percentages may constitute an index of psychogenic illness.

It was not possible to determine precisely how the staphylococcal organisms originally came in contact with the ham sandwiches. However it has been established with certainty that the sandwiches were stored for at least seven hours prior to the picnic in an unventilated and unrefrigerated truck, which was exposed to the heat of direct sunlight. As stated previously, the average ambient temperature for the day was close to 100 degrees Fahrenheit and, consequently, the growth of the offending staphylococcal organisms was rapid.

B. Symptomatology

Symptoms of the illness included nausea, uncontrollable vomiting and diarrhea, severe abdominal cramps, dizziness, and shock. Depression, the only observable emotional reaction to the disease, is believed to have affected 50 percent of those who were ill.

C. Onset Time

The onset of the illness (see Figure 1) occurred about two to five hours after ingestion of the contaminated food for 70 percent of the victims. The onset peak occurred during the third hour, during which 30 percent of all illnesses began. Seven percent of the individuals became ill in the first hour and 19 percent in the sixth and seventh hours.

Once the symptoms appeared, the illness developed very rapidly (within five minutes or less) into a severe form. Individuals would feel perfectly well one minute but would be violently ill the next. Persons becoming ill had very little, if any, warning regarding the onset of the illness because of the lack of premonitory symptoms.

D. Duration

The duration of the illness ranged between eight hours and 16 hours for 70 percent of all illnesses (see Figure 2). Most of the remaining 30 percent of the illnesses were of shorter duration, lasting from two to eight hours. A few persons were ill for 24 hours or longer.

CUMULATIVE
PERCENT SHOWING
SYMPTOMS

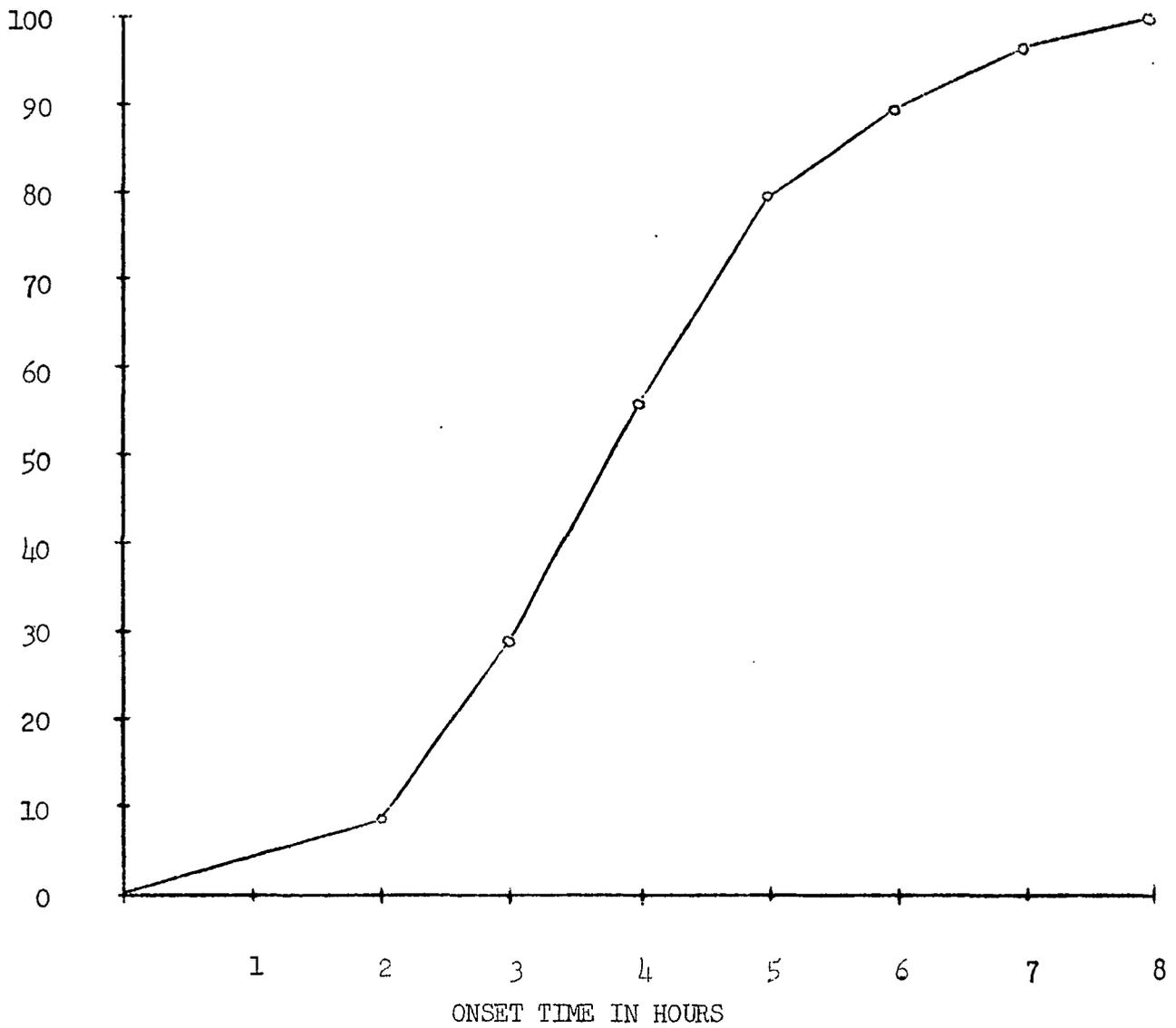


FIGURE 1

REPORTED ONSET TIMES FOR 1000 INDIVIDUALS
BECOMING ILL

CUMULATIVE
PERCENT
ILL

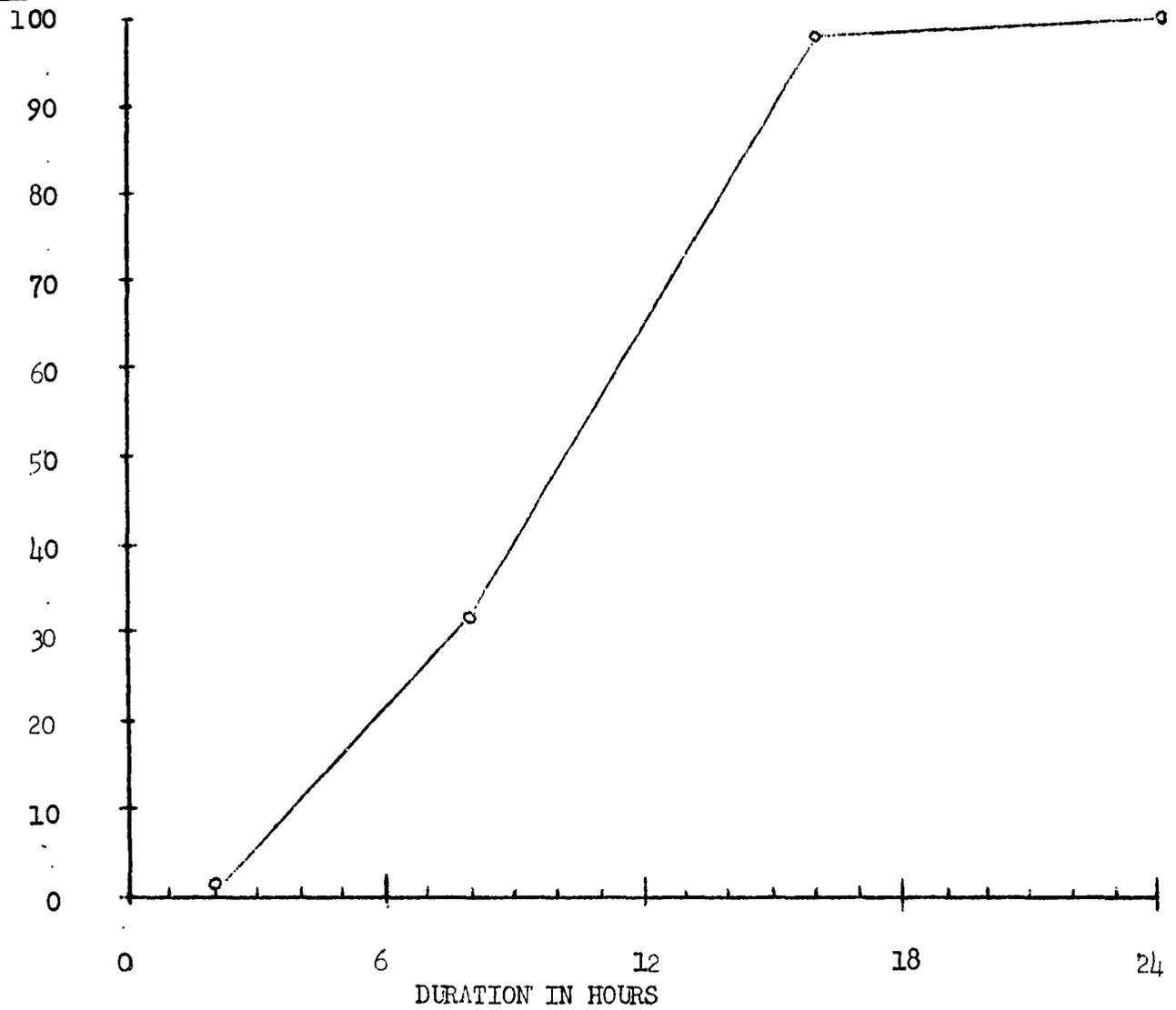


FIGURE 2

REPORTED DURATION OF ILLNESSES
FOR 1000 INDIVIDUALS

E. Incapacitation

Those who were ill appeared to be completely incapacitated during the height of the illness. They were unable to walk because of vomiting, cramps, dizziness, and weakness and were not capable of employing normal sensory motor skills such as might be involved in driving a motor vehicle, operating a telephone switchboard, or exercising the intellect to solve problems. When the most severe symptoms of the illness had passed, victims were able to walk with assistance but did not rally their intellectual or sensory-motor capacities to perform tasks more complex than walking; this, however, does not imply that they absolutely lacked the capacity for more complex tasks.

An estimate by doctors in Gabriel, where approximately 750 individuals were treated, indicated that 15 to 20 percent of the victims suffered from shock serious enough to warrant the administration of either intravenous saline or intravenous glucose solution and, in some instances, adrenaline as well. A further estimate indicated that, of those persons treated for shock, five to 20 percent would not have survived without treatment. In evaluating these estimates, it must be remembered that they are based on the recall of an extremely hectic situation during which there was little, if any, time to analyze events or

to reflect on them. However estimates made by physicians about the severe condition of certain patients are supported by the fact that a special room in the armory was set aside where the sickest individuals could be watched closely.

The majority of victims, after getting over the most severe physical manifestations of the illness, reported a profound feeling of depression with an attendant lack of motivation for any activity other than sleeping or resting. Although it is not possible to give accurate estimates of the prevalence of depression as an emotional reaction, it is believed to have affected at least 50 percent of those who had been ill. Many victims said they had frighteningly strong wishes to die during the illness. In retrospect it seemed to them that they would have actively embraced death if given the opportunity.

It is a well accepted fact in psychiatric practice that the expression of a wish to die must be taken seriously and that a watchful eye must be kept on such patients to forestall attempts at suicide. Because of the incapacitating effects of staphylococcal food poisoning it is unlikely that the danger of active attempts at suicide is very great; that is, evidence leads to the conclusion that afflicted persons are not physically able to make such attempts. Nevertheless, suicide or other self

damage as the result of the extreme lassitude produced by the illness is a distinct possibility.

Further, it is to be expected that a large number of the persons suffering from staphylococcal enterotoxin poisoning would tend not to attempt to remove themselves from situations in which they might suffer injuries or other unpleasant experiences as the result of actions taken by some outside agency. However if there are a sufficient number of well individuals among the afflicted (one third to one half of the number of those who are ill), it should prove relatively easy for them to remove the ill persons from the dangerous environment. The reason for this is that even during the most severe stages of the illness, as long as shock is not involved, afflicted individuals are believed capable of locomotion with assistance. Naturally the speed of locomotion, unless assisted by motor vehicles, would be extremely slow and of short duration.

It is difficult to imagine that an adult individual who is ill with staphylococcal enterotoxin poisoning would be capable of walking more than one half of a mile even when assisted or that he would be capable of proceeding at a pace faster than a slow stroll. In addition, neither ill persons nor those assisting them in removal from a potentially dangerous area can be expected to

carry much in the way of equipment or personal possessions unless the number of well persons equals or exceeds the number of those who are ill. It should not be expected that ill persons, after reaching their destinations, would be capable of manual labor, skilled work or executive functions unless six or more hours elapsed since the onset of the illness. Generally, one must expect that there will be a serious decrement in the energy available to victims for a period of 24 hours after the onset of the disease. The capacity for skilled work may not be impaired to the same extent as the capacity for intellectual exertion or heavy manual labor. Serious impairment of skilled activities may be expected to last for at least 12 hours, or possibly longer if a depressive state of mind persists.

In the Gabriel epidemic individual incapacitation was noted particularly in respect to the operation of motor vehicles (see Figure 3). In many instances illness struck while the individuals were driving; in all known cases of this nature the driver was able to exercise sufficient self-control to stop the vehicle and no automobile accidents resulted. However in many cases the cars were not pulled off the road; neither were the engines stopped nor the doors closed. In fact, on the roads between Gabriel and Croydon there were 66 disabled motorists

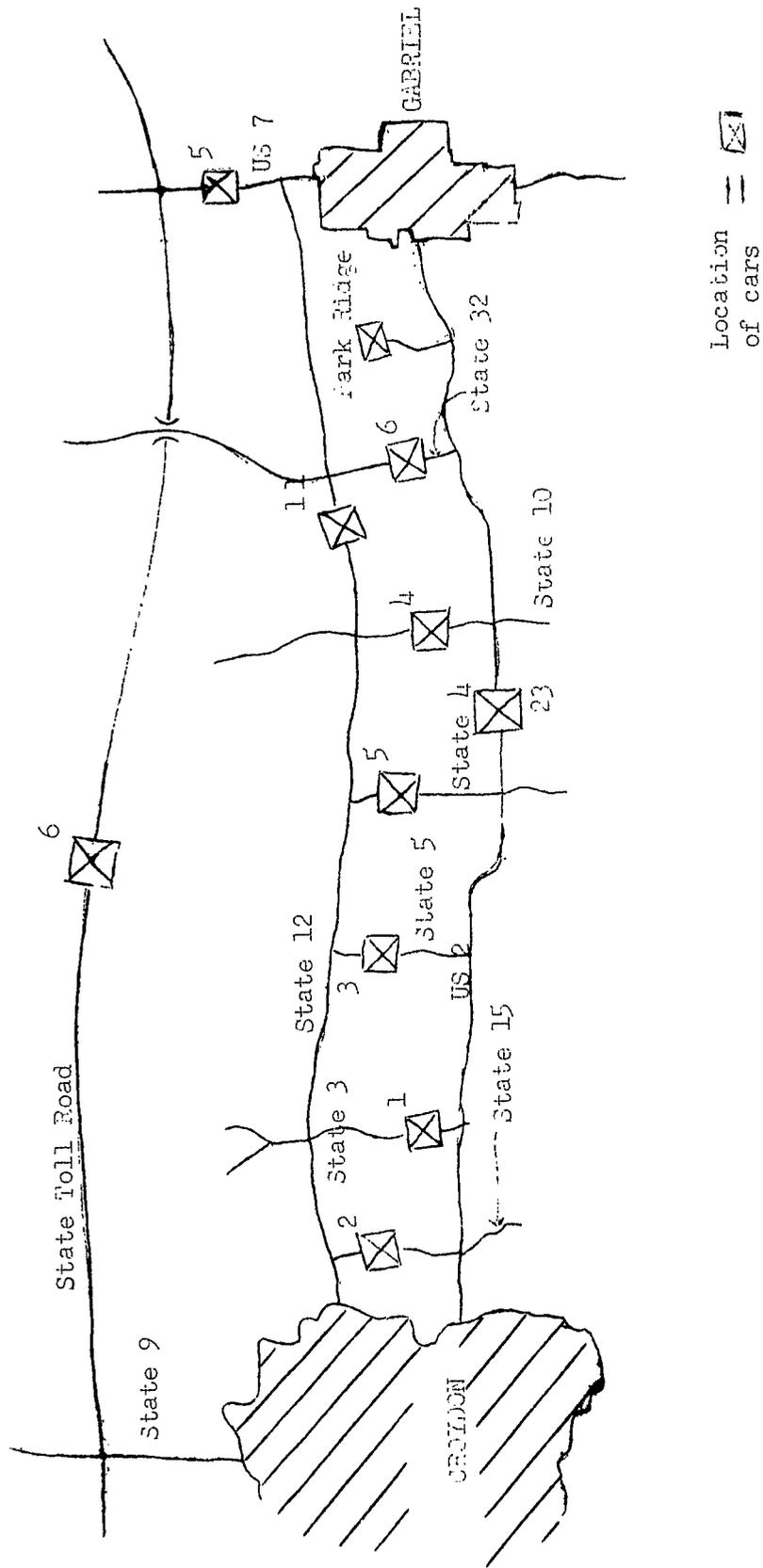


FIGURE 3
 LOCATIONS AND NUMBER OF MOTOR VEHICLES
 INOPERATIVE BECAUSE OF OCCUPANT
 ILLNESS ACCORDING TO
 STATE POLICE

(see Table I) from about 2:00 P. M. to 7:00 P. M. The state police and volunteers had removed all victims by 7:00 P. M. , but many of the abandoned cars remained.

F. Diagnosis, Prognosis, and Treatment

The physicians who treated afflicted individuals claimed to have immediately diagnosed the illness as non-fatal food poisoning, although most said that they did not know specifically that staphylococcal enterotoxin was involved. All of them stated that they immediately ruled out the possibility of botulinus poisoning. They envisioned a favorable outcome for all illnesses and did not anticipate complications except where shock or loss of fluids appeared to be severe. In some of these severe cases, physicians reported that guarded prognosis would have been called for if medical aid had not been readily available.

Treatment was entirely symptomatic. The kinds of oral medications employed included anti-emetics, anti-diarrheics, gastrointestinal anti-spasmodics, sedatives, and tranquilizers. Specifically, the most frequently used medications were Paregoric, Kaopectate, Dramamine, and Phenergan. Opium derivatives and substitutes such as Demerol were also used frequently. Used less frequently were Thorazine, Castor Oil, and various analgesics

TABLE I

DISTRIBUTION OF ABANDONED PASSENGER
AUTOMOBILES
BETWEEN GABRIEL AND CROYDON
ACCORDING TO STATE POLICE ESTIMATES

Size and Type of Highway	Location and Direction	Number of Abandoned Cars
Divided 4 Lane Heavy Duty	East-West Gabriel-Croydon	6
2 Lane Heavy Duty	East-West Gabriel-Croydon	23
2 Lane Medium Duty	East-West Gabriel-Croydon	11
TOTAL: East-West Roads between Gabriel & Croydon		40
3 Lane Heavy Duty	North-South through Gabriel	5
2 Lane Medium Duty	North-South 9 miles West of Gabriel	6
2 Lane Medium Duty	North-South 14 miles West of Gabriel	4
2 Lane Medium Duty	North-South 22 miles West of Gabriel	5
2 Lane Medium Duty	North-South 29 miles West of Gabriel	3
2 Lane Heavy Duty	North-South 37 miles West of Gabriel	1
2 Lane Heavy Duty	North-South 45 miles West of Gabriel	2
2 Lane Medium Duty	North-South through Croydon	0
TOTAL: North-South Roads between Gabriel & Croydon		26
TOTAL: All Roads between Gabriel and Croydon		66

such as Aspirin, Vesprin, and Dipyron. As already stated (P. 23), saline or glucose solutions, occasionally combined with adrenaline, were given intravenously to about 20 percent of ill individuals, viz., those suffering from shock. Although information is incomplete, it is believed that the only medication exhausted was injectable Dramamine. It was not resupplied; instead, other medications were substituted.

Hypodermic needles and syringes were in good supply although they had to be reused after being sterilized. No shortage of such devices as stethoscopes and sphygmomanometers developed.

Stomach pumps were used very infrequently, if at all, since vomiting was a primary symptom and since persons not stricken apparently did not seek prophylactic measures. Also, it is not known whether or not sufficient stomach pumps were available.

G. Age and Health Factors

No fatalities or injurious side effects were reported despite the fact that the victims represented a very heterogeneous population in regard to both ages and normal states of health. Among those ill there were several with cardiac

conditions, some with diabetes, and several pregnancies--one of which was close to term.

Children as young as two years old became ill, as well as individuals in their eighties. According to a report from the Johnson Co., based on 1161 questionnaires, 57 percent of the persons attending the picnic were below the age of 18 while the remaining 43 percent were above that age. This sample, because of its size in relation to total attendance, is likely to be representative of the total picnic population. However, because of time and manpower limitations it was not possible to establish an independent check on this figure.

When the division in ages (from two to 18 and 18 to 80) is analyzed in terms of the numbers of persons becoming ill within each age group it is seen that only 53 percent of the younger group became ill whereas 66 percent of the older group was sickened. It is extremely difficult to draw any conclusions from these figures. First of all they have not been verified; secondly, no one knows the total number of persons in each age group or the amount of toxin to which they were exposed. Thus the lower incidence of illness for the younger group could be explained in many ways, such as greater natural resistance to the toxin, fewer persons exposed, smaller average dose, differential ingestion of

nutrients prior to being poisoned, etc. It is only safe to state that about 60 percent of the persons attending the picnic did become ill in varying degrees of severity. None of the information obtained about the symptoms or treatment of the poisoning suggests that there was any systematic difference in the type or severity of symptoms that was either attributable to age or related to it. Unfortunately it was not possible to obtain a finer distribution of age than that given above. Also, it was not possible to obtain any distribution by sex, health, or socio-economic status.

H. Effects on Croydon Industry

Representatives of the Johnson Co. stated that virtually all of their employees reported for work on the Monday following the picnic and that production was not affected in any noticeable fashion. However, a Croydon newspaper reported that 100 employees were absent from the plant on Monday, and that this resulted in the closing of one production line. After contact with representatives from both the Johnson Co. and the Croydon newspaper, one is inclined to accept the newspaper account of the effects of the epidemic on Croydon industry.

II. THE EMERGENCY SITUATION

A. Civil Defense Activities

The first symptoms of food poisoning at the picnic began about 1:30 P.M., Saturday. By 1:55 P.M. the first ill individual had been admitted to a Gabriel hospital, and by 2:00 P.M. a sufficient number of ill people had arrived in Gabriel to indicate that the illness was likely to be widespread. By that time, also, calls for ambulances had gone out from Park Ridge, the picnic ground. The mayor heard the calls coming over the police radio while conferring with the police chief about other matters. Shortly thereafter, while going out for a cup of coffee, the mayor was hailed by an ambulance driver who was returning from a run to the picnic grounds. The driver indicated to the mayor that an epidemic was developing. The mayor immediately returned to his office and telephoned the Gabriel CD director. However the director had already been informed by a nurse at one of the hospitals that an unusual number of persons were becoming ill. She, in turn, had obtained the information from a victim who had just arrived at the hospital.

In accordance with a previous informal agreement, the mayor placed all town agencies, including the police and fire

departments, under civil defense direction; this, however, did not include the two hospitals, since they are privately owned and operated. It should be emphasized that no formal plan had been drawn up to specify the precise circumstances under which such a transfer of authority would take place.

The Gabriel CD director's first step was to make three calls to alert his section chiefs, who in turn called their staffs, and to arrange for the use of the school gymnasium. However, soon after the CD director arrived at the school to meet with his workers and to direct preparations, he received messages indicating that the influx of ill individuals exceeded previous expectations. As a consequence, it was now decided to use the more capacious armory and to hold the gymnasium in reserve. By 3:00 P.M. the Gabriel CD control center was operating in the armory, which had been readied to receive several hundred patients. The first arrivals, who were initially directed to the gymnasium, were transferred to the armory. Additional CD activities are indicated below:

1. Two-way mobile radio communications were established between the CD center in the armory, the town hall, the two hospitals, and a traffic control point. This enabled CD headquarters to keep a census of the patient influx at the hospitals and the armory.
2. Two additional telephones were installed in the CD center.

3. A traffic control point was established at the Gabriel perimeter to direct incoming victims to either the armory or one of the hospitals. These directions were based on the census maintained by mobile radio communications.

4. Unessential traffic was shunted away from the immediate vicinity of the armory and the hospitals.

5. Auxiliary police guarded parked cars in the vicinity of the hospitals and armory since most of the cars belonging to ill persons had not been locked.

6. Floodlights were set up to illuminate the armory and approaches to the hospitals.

7. All physicians in Gabriel were contacted. The physicians subsequently worked out a 24-hour schedule among themselves to provide medical care for the armory and hospitals.

8. Arrangements were made to register victims by name, home address, and severity of illness.

9. Arrangements were made to find housing in Gabriel for well relatives of the victims.

10. The amounts of vomitus and fecal matter which accumulated in the armory and the hospitals were so large that the easiest way to dispose of them was by burial, and this required the services of special disposal squads equipped with shovels and bulldozers.

A serious difficulty in the efficient treatment of victims was caused by a shortage of patient identification tags. This was never rectified. Without tagging each person in the great influx of patients, it was difficult to know who had been treated and what treatment had been administered. Consequently, it is quite possible that some persons were treated more than once and others not at all.

The bad features of this situation were compounded by the fact that a considerable number of patients were transferred from one hospital to another. Obviously, excessive or inadequate dosage of various medicines can have serious consequences.

Relatives and friends of ill individuals did not panic or become emotionally wrought up and, generally, they did not seek out physicians or Gabriel CD officials to inquire about the seriousness of the illness. Most of them had probably been reassured about the benign nature of the illness and consequently did not interfere with the treatment process. However, the mobile radio communication units were often functioning at a low level of efficiency because of the demands made on them by individuals wishing to locate family members or friends from whom they were separated. Apparently Gabriel CD communications had not put into effect adequate criteria for message priorities.

B. Communications

In any large scale emergency of the sort described here, communications facilities are of paramount importance. They are required to coordinate the many small efforts that contribute to the successful handling of an emergency. The Gabriel civil

defense organization has recognized this and has consequently made it its policy to ask the public to refrain from the use of telephones during emergencies.

Fortunately, none of the Gabriel residents were victims of the emergency and therefore they placed few, if any, personal calls for help. Nevertheless if Figure 4 is consulted it can be seen that on the first day of the epidemic local telephone traffic increased about 35 percent over normal. During the two days of the epidemic, telephone traffic in Gabriel increased approximately 27 percent over normal; this figure includes all calls except incoming toll calls on the second day of the epidemic.

Normal base lines and all other telephone traffic information were supplied by the General Telephone Company. The normal base lines were estimated by examining traffic volume for the same days and weeks of the month for several years, and also by finding the telephone traffic volume for several weekends immediately preceding the epidemic. Gabriel had 1831 connected phones at the time of the epidemic so that an average of five additional calls were made per connection.

Unfortunately, data were not available regarding the proportion of all calls that were connected with the emergency;

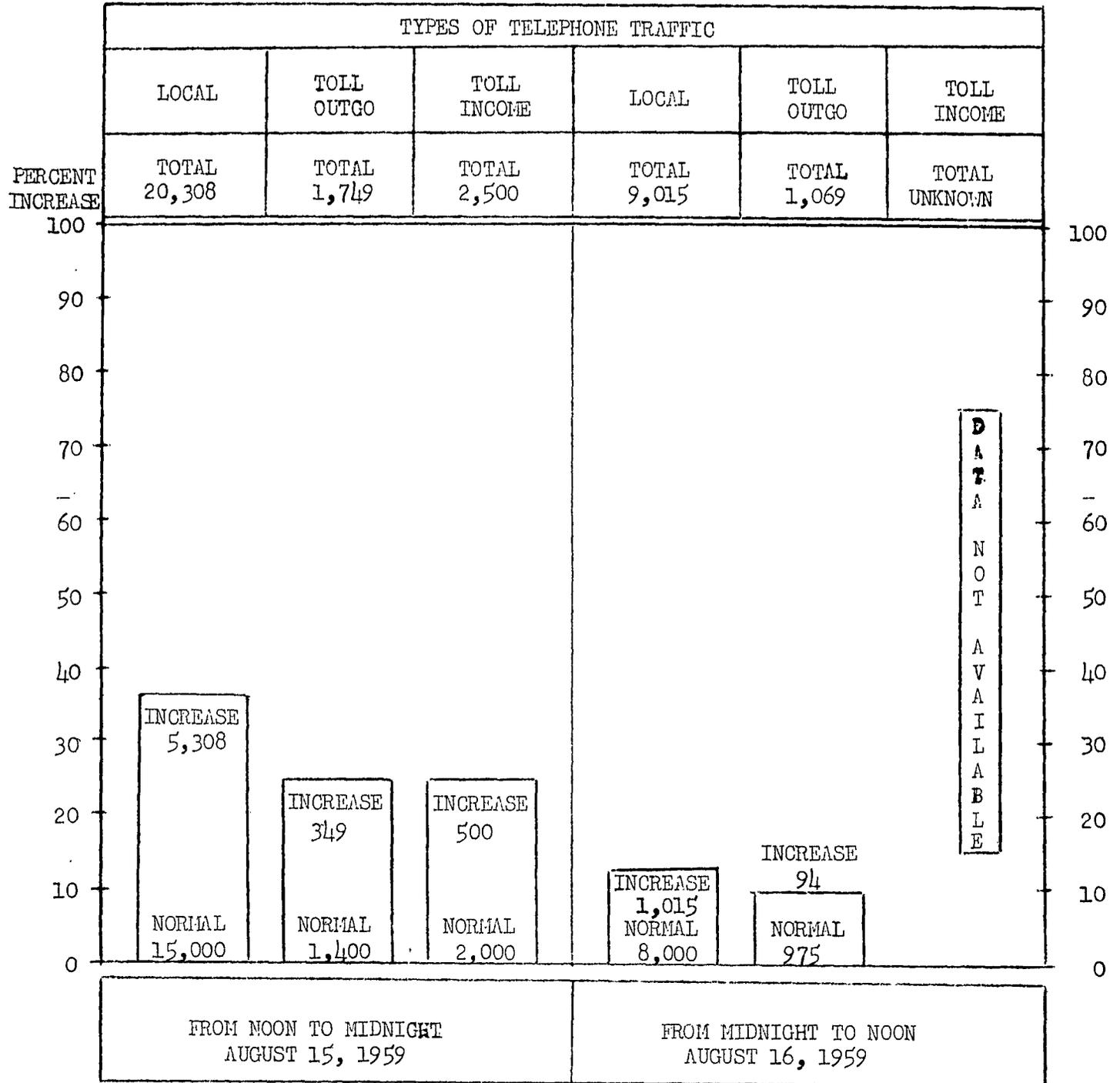


FIGURE 4
 PERCENT INCREASE OF TELEPHONE CALLS ASSOCIATED
 WITH FOOD POISONING EPIDEMIC IN
 GABRIEL

however, in cost estimates the increment in calls noted above is attributed to events connected with the epidemic.

Croydon radio and TV stations, which carried the news of the epidemic within an hour of its occurrence, made reassuring statements about the prognosis of the disease and gave helpful hints for first aid treatment. These communications media also performed a public service by alerting physicians in Gabriel of the community's need for them and by broadcasting instructions to persons who had become ill while driving to turn on their headlights as a signal to state police patrol cars. However, reporters for these media did arouse some resentment among Gabriel CD workers by getting underfoot in the armory, particularly with TV equipment. It is doubtful, though, that they caused significant disturbance in emergency procedures. Furthermore it is to the credit of the Croydon radio and TV stations that they did not overstate the proportions and severity of the emergency in their broadcasts; overstatement has occurred in other locations under similar circumstances. Exaggeration of the seriousness of such a situation by public communications media can paralyze essential communications in the localities affected.

C. Treatment Personnel

Ten of the 15 physicians in Gabriel and about 20 of the 30 hospital nurses were available to cope with the epidemic. As far as could be determined all of the 22 orderlies and hospital nurses attended to the victims. The doctor-patient ratio (about 1:70) and the RN nurse-patient ratio (about 1:35) were just about adequate to handle the number of patients involved. The cumulative patient influx rate for Gabriel was about as follows: of the total 750 persons, 30 percent arrived during the first two hours, 55 percent arrived during the first three hours, 75 percent arrived during the first four hours and the remaining 25 percent arrived during the fifth, sixth and seventh hours.

Although Gabriel physicians did at one point think that out-of-town medical assistance would be necessary, the influx of patients decreased just then and no request for assistance was made. One physician indicated that the medical staff could probably have handled about 250 additional individuals if more as well as better equipped facilities were available. Several cited an Army field hospital as being ideal for such operations. The staff, of course, would have to be thoroughly trained in the operation of a setup of this type. It was also indicated that

Gabriel, with its present medical resources, could have handled the number of patients actually involved in the epidemic for about a week without outside help, providing that no surgical or orthopedic procedures were required. The staff-patient ratio and patient influx rate at Croydon were, of course, far more favorable than at Gabriel. Croydon is a considerably larger community and is thirty times as far from the picnic grounds as Gabriel; consequently, it received only about 130 hospital patients.

In addition to the regular Gabriel professional staff, many former nurses and other persons not at the time connected with medicine or public health volunteered their services to aid in the care of victims. The number of these volunteers is unknown because they were not registered; however, authorities agree that about 150 persons (excluding Gabriel CD personnel, firemen, and friends and relatives of victims) came to the armory and hospitals to offer help in caring for the ill. Although reports vary with regard to the effectiveness of these volunteers, it is generally agreed that they did provide valuable services in comforting and assisting the patients and in cleaning up. A number of respondents to investigative inquiries also felt that because these volunteers were not responsible to a central authority, such as Gabriel CD, they were not used as efficiently

as they might have been. In many instances the presence of these volunteers added to the existing confusion since they lacked specialized training and had to be given lengthy instructions as to what to do.

While it is doubtful that efforts to aid the victims would have been significantly less effective without such volunteers, it must be emphasized that volunteers (especially friends and relatives) did undoubtedly contribute to the comfort and feelings of security of those who were stricken.

It is estimated that about 350 persons who attended the picnic and were not affected by the toxin came to Gabriel with those who were ill. About one half of this healthy group were either too young (the more common case) or too old to be of assistance. While many of the remaining 175 did volunteer aid to the ill, a sizable number spent most of their time attempting to locate relatives or friends from whom they had been separated. This latter activity put considerable strain on the already heavily burdened radio communications facilities, as discussed under (II. A.), and caused a substantial reduction in the effectiveness of Gabriel CD and related operations.

D. Treatment Facilities

Since the total number of available beds in the two Gabriel hospitals was only about 70, the armory treated the greatest number of individuals. According to a rough estimate, 150 persons, both ambulatory and non-ambulatory, were treated in both hospitals, while the remaining 600 were cared for at the armory. Were it not for the fact that one of the high officials of the Johnson Co. directed picnickers to return to Croydon when the first illnesses occurred, the patient influx at Gabriel would have been larger. Many of those attempting to reach Croydon were, of course, overcome on the road and had to be brought in by ambulances and state police cars. It took until 7:00 P. M. Saturday to clear the roads of ill individuals, although many cars were temporarily abandoned until Sunday or Monday.

Both Gabriel hospitals managed to approximately double their bed capacity by setting up spare beds, cots and mattresses in hallways and other areas not usually used to accommodate patients.

Many mattresses, sheets, pillows, and blankets were spontaneously supplied by the townspeople. Bedding (mainly for armory use) was also obtained from the dormitories of a local college and from the YMCA of a near-by community.

Because of inadequate sanitary facilities and receptacles at the hospitals and the armory, a local dairy supplied all of its unused waxed cups which were to be used as containers for various dairy products.

E. Involvement of Outside Agencies

The State Police and the State Department of Health were involved in the food poisoning epidemic. The National Guard can also be thought of as having been involved since the armory was used as a major emergency facility.

The function of the State Police was primarily to check the roads between Gabriel and Croydon for vehicles containing ill persons and secondarily to employ their radio equipped cars as communications facilities. The State Police transported persons mainly to Croydon hospitals since Gabriel facilities were overcrowded. As stated previously, local radio stations had advised drivers who suffered ill effects from the picnic to pull over to the side of the road and turn on their car lights so that State Police would see them.

On the first day of the epidemic the State Police added 20 officers and patrol cars to its normal complement of ten in the Gabriel-Croydon area. Three officers and cars were added to the normal complement of eight on Sunday.

F. Conclusions about Community Response

On the whole, Gabriels' s response to a sudden, unanticipated influx of 750 ill individuals was remarkably rapid and efficient. Within an hour of the first arrivals, the armory had been supplied with beds, mattresses, blankets, medical supplies and other essential items, and the CD control center was in full operation there. By the end of that period, all other facilities, including a reasonably efficient communications network and a traffic coordination system, were fully staffed and operating.

Less information is available regarding the manner in which Croydon coped with this problem. However, despite the fact that it handled only 130 hospital cases, the proportional amount of disorganization produced seems to be greater than the disruption caused by the influx of 750 patients in Gabriel, which has a population of only 6000. Unlike Gabriel, Croydon had not developed a well organized core of CD personnel and had not initiated practice alerts and paper exercises for disaster situations. Further, it did not have a central authority to handle and coordinate disaster relief work.

In Gabriel, apparently, there was considerable transfer of training from practice drills and from discussions of how to

handle a variety of emergencies. It should be noted that this transfer of training involved considerable generalization since the Gabriel CD organization had never simulated the type of emergency presented by the food poisoning episode.

Undoubtedly, the fact that the Gabriel CD director and mayor had repeatedly discussed the role of CD in relation to the function of various town services made possible a smooth and effective transfer of authority when the epidemic occurred. It seems, consequently, that in a town of Gabriel's size no rigid preparedness plans are needed to cope with this kind of disaster; in fact, very detailed planning would probably hinder the speed and effectiveness of the town's reactions. It appears that effective improvisation in Gabriel was possible because (1) its size facilitated personal acquaintance among town officials and community leaders and (2) an energetic and devoted CD chief had seen to it that these persons were kept informed about the general role and plans of the Gabriel CD organization. It is doubtful that such loose planning would be effective in communities much larger than Gabriel, although it is impossible, on the basis of present knowledge, to predict a town's critical size in this respect.

It is quite possible that a larger community, for example, Croydon, would find it more difficult to develop a central coordinating authority because its administrative organization has intrinsic to it more relatively autonomous positions of authority and vested interests which offer potentially greater resistance to coordinating efforts. Another explanation of the apparently less expeditious handling of the emergency situation in Croydon is that the stress placed on community facilities may not have been great enough to force central coordination on the community as a matter of necessity. Perhaps there is a critical mass of stress which is required to bring about a centrally coordinated control of facilities within a given community. One may speculate that the size of this critical mass has a positive covarying relationship with the size of the community and a negative covarying relationship with the compactness of the community's de facto structure of authority.

G. Brief Descriptions of the Communities

In order to provide a comprehensive view of the responses of the unaffected groups dealing with the ill persons, a brief description of these two communities is in order.

1. Croydon

Croydon is the home of the Johnson Co. and nearly all of its employees. It is a town of 35,600 inhabitants and has many small and some large manufacturing industries. The products of these industries include trailer homes, sheet metal, musical instruments, machine tools and machinery, electrical appliances, telephones, rubber, and cardboard. Croydon has one TV station and three radio stations. It is on the fringe of large TV receiving areas.

Croydon has a general hospital with 196 bed capacity and 65 nurses (RN), 13 practical nurses, and 63 orderlies. In addition, nearly all physicians in Croydon have access to the hospital. There are about 50 physicians who are either general practitioners or specialists in internal medicine. Of these, 38 are in private practice while the remainder are attached to the hospital, clinics, industrial concerns, etc. Usually, about one half of the nursing and aide staff is on duty at any given time during the day, and a permanent staff of about ten physicians is in attendance at the hospital. The Croydon clinic constitutes the only other medical facility; it is solely for out-patients and is staffed by about five physicians and a variety of auxiliary medical personnel. A clinic is also maintained by the Johnson Co. in order to give first aid to

accident cases, to examine employees reporting ill during work and to give physical examinations to prospective employees. There are two or three beds at the clinic and one physician is on call.

Emergency services in Croydon are provided by the police and fire departments. The former consists of 67 men and is equipped with two-way radio communication. There are two ambulances, which are dispatched by police radio and manned by a crew of six firemen. In addition, three hearse-ambulance combinations are available from local undertakers.

2. Gabriel

The town of Gabriel is 60 miles due East of Croydon, at the center of a popular summer vacation region that is dotted with lakes and cabins. Gabriel serves vacationers as a shopping and service center. In addition, considerable farming and a small amount of manufacturing takes place in the vicinity of Gabriel. The town population of about 6000 includes 1500 students and faculty members of a local college.

Despite the fact that Gabriel is a small town, virtually every known service club is represented there. From this, one may surmise that the town is unusually organization conscious. This view was supported by all respondents, one of whom

commented, "when two people meet on the street here, they form a committee; one person becomes its chairman and the other its secretary." Most of the clubs in Gabriel are very active in civic affairs and are almost continually involved in some substantial community project.

It is consequently not too surprising to find that Gabriel has a numerically modest but effective civil defense organization. The CD director serves without compensation and has, in fact, because of the lack of local and federal financial support, had to invest substantial funds of his own in the organization.

No detailed plans to cope with different types of emergencies had been prepared by the Gabriel CD director prior to the food poisoning epidemic. However, his civil defense workers had been organized into a number of distinct units with broadly specified functions, and each of these units was directed by some previously appointed individual whose responsibilities were also specified in a broad way. In addition, the organization had worked in the field during simulated disaster situations and had also conducted paper exercises for a number of emergency conditions. However, a total of fewer than ten exercises of both kinds, spread over a four or five year period, were involved.

A number of informal discussions about responses to disaster situations had also taken place during meetings of Gabriel CD workers.

The total Gabriel CD organization consists of about 525 persons; of these, 125 form an active nucleus while the remaining 400 are merely card carrying members.

III. COST OF THE EPIDEMIC

Estimated cost can be considered to be a measure of the severity or magnitude of the emergency situation being described. Table II gives the bases on which total costs were computed.

In treating about 1000 persons suffering from the symptoms of staphylococcal enterotoxin poisoning, considerable quantities of medicine were consumed, bedding was made unusable or required laundering, food was consumed by recovered patients and their relatives, unusually large numbers of telephone messages were handled, public and privately owned vehicles were used heavily, etc.

At present it appears that provisions have not been made to underwrite expenses incurred in Gabriel and Croydon during the epidemic. After the epidemic, Johnson Co. spokesmen let it be known that they would meet all expenses. The Gabriel CD director judged the validity of all claims originating in Gabriel before payment was made by the company. Claims made in Croydon were processed directly by the company.

Indications are that Johnson Co. promptly paid all bills on presentation. In fact, they went further, presumably in order to win good will, by promising to give the Gabriel CD

TABLE II

ESTIMATED MONETARY VALUE OF SERVICES AND MATERIALS

Type of Service	Reimbursed Services	Source of Reimbursement	Estimated Value of Unreimbursed Services	Total Monetary Value
A. <u>Medical Personnel</u>				8515
Physicians	1,715	Johnson Co.	1500	
RN, Aides, Practical Nurses, Orderlies			5300	
B. <u>Laboratory Work</u>				<u>500</u>
Local			200	
State			300	
C. <u>Medicines</u>	215	Johnson, Co.	400	<u>615</u>
D. <u>Hospitals</u>	5,225	Johnson, Co.	995	<u>6220</u>
E. <u>Croydon Municipal Services</u>		Johnson, Co.	2450	<u>2450</u>
F. <u>Gabriel Civil Defense and Municipal Services</u>				<u>4127</u>
CD Vehicle Operations	855	Johnson, Co.	100	
Salaries of CD Workers				
Salaries of Firemen			1200	
Salaries of Policemen				
Salaries of Ambulance Drivers			750	
Food	40	Johnson, Co.		
Emergency Bedding			350	
Miscellaneous Supplies	532	Johnson, Co.		
Fans			250	
Disposable paper Containers			50	

TABLE II (continued)

Type of Service	Reimbursed Services	Source of Reimbursement	Estimated Value of Unreimbursed Services	Total Monetary Value
G. <u>Telephone Communications</u>				<u>2845</u>
Wages			1725	
Calls			1120	
H. <u>State Police</u>				<u>1165</u>
Vehicle Operations			475	
Personnel Salaries			690	
I. <u>Miscellaneous</u>				<u>720</u>
Cleaning of Textiles				
Flood Lighting				
Radio				
Registration			750	
Billets				
Buses				
<u>TOTAL</u>				<u>27157</u>

organization a fully equipped emergency rescue truck in recognition of services rendered.

The following types of expenses, and possibly others, are believed to have been met by the Johnson Co. :

- a. All medications,
- b. All hospital bills (One hospital manager indicated that his institution would have charged nothing if officials of the Johnson Co. had not offered to pay the bill.),
- c. All food bills,
- d. All bills for bedding that was unserviceable after use,
- e. All laundry bills, and
- f. Services of physicians.

No payments were made to or requested by:

- a. Civil defense workers,
- b. Lay hospital aides, and
- c. Other volunteer workers who contributed miscellaneous services.

The General Telephone Company handled over 7000 calls that were related to the emergency. This figure includes 300 incoming calls to the Gabriel CD control center. No charges made for the installation of extra phones at the CD control center or the calls made from this center.

In general, then, goods and services were freely contributed for the aid of victims and no one suffered serious loss as a result. It is possible that institutional and personal financial considerations might have reduced the efficiency with which the emergency was handled if the emergency was more severe, more widespread or of longer duration.

Costs for the Gabriel epidemic are estimated to have been 25 dollars per ill individual, with 70 percent being spent for medical purposes. This estimate does not include such items as hospital plant maintenance or similar overhead expenses. The estimate does, however, take into account expended medicines, bedding, and other materials; automobile fuel and depreciation are computed on a 10 cents per mile basis; also included are fees and salaries for all services. Persons, other than well companions of the ill, who donated their services are included at a rate of pay that would have been normal for the type of service rendered.

About 5000 man-hours were invested in all phases of aid or five man-hours per ill individual. Seventy-eight percent of the total was accounted for by medical, nursing and first aid activities. The estimate does not include such aid as may have been rendered by family members or friends of the victims.

IV. DATA COLLECTION

A. Limitations

Because systematic monitoring of news and public health reports was not included in the scope of Project Summit activities, and because it was also beyond Project Summit's manpower capacities to preplan the investigation of events as they happened, a lag of six weeks occurred before the study could get underway. Although this study uncovered much valuable information about the epidemic, the delay resulted in a considerable loss of important data. Some information had to be obtained from secondary sources. Respondents actually involved in the epidemic were prone to forget many details and omit information of little interest to them but of great potential value to the investigation. In addition, some persons involved in the epidemic were out of town.

Before the Task Surprise investigator went to Gabriel, arrangements had been made via telephone calls and letters to the Johnson Co. and the mayor of Gabriel to obtain information about the epidemic; however, the officials of the Johnson Co. would not supply the names of their employees who had been victims of the epidemic or describe the role of their staff in handling the epidemic. The reason for this reluctance may be found in the fear

company officials expressed about possible legal suits, adverse developments in labor relations, and damaged public relations, as the result of the epidemic and the attendant world wide publicity. The attitude expressed was, "let 's forget all about this horrible event--the sooner the better."

However, after lengthy correspondence with company officials subsequent to the trip, a letter was received which indicated the payments they made to persons and organizations for services rendered during the epidemic. These data proved most helpful in arriving at an estimate of the total cost of the epidemic.

Public officials and victims of the epidemic proved to be very cooperative and helpful in discussing the epidemic. This was true especially of the public officials in Gabriel who were not influenced by representatives of the Johnson Co.

B. Suggestions for Future Investigations

In future investigations it would seem best to make inquiries of persons in business and industrial concerns only after other pertinent individuals had been interviewed; exceptions to this rule would, of course, occur when the concerns involved had control over all or most sources of information.

5/2

UNITED STATES ARMY
CHEMICAL CORPS BIOLOGICAL LABORATORIES

FORT DETRICK, MARYLAND

CMLRD-BL-2

28 May 1962

Dr. James H. Gardner
Deputy Director of Defense
Research and Engineering
Room 3E1019, The Pentagon
Washington 25, D. C.

Dear Dr. Gardner:

I am enclosing a copy of "Task Surprise - Final Report" which describes the large outbreak (over 1100 cases) of staphylococcal enterotoxin food poisoning which occurred among the employees of the Miles Laboratories on their annual picnic in August 1959. The first 17 pages of this report represents a brief condensation of the facts and the conclusions drawn. I think you will find this a worthwhile addendum to our discussion of 16 May 1962.

I am also forwarding a copy of the proceedings of the Conference on Airborne Infection which was held in December 1960. This conference brought together many of the leading investigators interested in this field of research. The presentations and discussions represent a modern, comprehensive and authoritative review of this subject which is so fundamental to our program.

My colleagues and I thoroughly enjoyed the opportunity which our meeting on 16 May presented for a detailed scientific discussion with you.

Sincerely yours,



HAROLD N. GLASSMAN
Assistant Scientific Director

2 Encls:
Report
Proceedings

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Delay resulting in the loss of important and often unique information can also be avoided. First, epidemiological news appearing in medical literature, public health literature, and newspapers can be monitored continually; second, a stand-by facility can be developed to investigate promising situations after only a minimum of delay (a week at most).

A stand-by facility would be staffed by personnel competent in matters of public health and demography and capable of locating and using essential source materials. The personnel should also be experienced in the application of investigative methods for uncovering the "effects facts" on the scene. These methods require skills in survey research, interviewing, and content coding and generally a competence in the social sciences. Since such methods remain fairly constant regardless of the nature or location of the event to be investigated, a great deal of investigative work can be preplanned for instant use when required. That is, interview schedules can be prepared; source materials can be collected, e.g., telephone books and directories of CD personnel, police, and physicians; contacts with local agencies can be established (CD, State Police, Fire, etc.). Project Summit personnel can be trained in skills that are needed to extract maximum information

from events such as the Gabriel epidemic. Naturally the application of the methods would be subject to continual revision as the interests of Project Summit changed and as field experience indicated the advisability of revision.

V. APPENDIXES

A. Technical Report on Staphylococcal Enterotoxin

The succeeding document has been incorporated into this final report on Task Surprise to provide military and civil defense authorities with a comprehensive understanding of staphylococcal enterotoxin as an agent of disease.

STAPHYLOCOCCAL ENTEROTOXIN

Prepared by

Dr. Harry E. Morton, Prof. of Bacteriology,
School of Medicine, Univ. of Pa.

Mr. George H. Rothblat, Junior Research
Investigator, ICR, Univ. of Pa.

The Institute for Cooperative Research

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I. INTRODUCTION

Since man usually encounters staphylococcal enterotoxin in contaminated food, the reaction to the enterotoxin is commonly referred to as food poisoning. It is now known that man and other animals may show the same symptoms after receiving the enterotoxin by ways other than by the ingestion of food. The purpose of this report is to present a summary of some of the work being done on this interesting agent of disease.

II. STAPHYLOCOCCAL ENTEROTOXIN

A. Agent Characteristics

Staphylococcal enterotoxin is a protein produced by many strains of Staphylococcus. During their growth the staphylococci elaborate the toxin into their environment so the poisonous substance is an exotoxin which may be obtained free from the bacterial cells. The toxin is usually absorbed through the gastrointestinal tract (the enteric tract) and some of the symptoms produced are related to this tract. The toxin is therefore called enterotoxin to differentiate it from the other exotoxins which are produced by staphylococci and which act differently upon the animal body.

Staphylococcal enterotoxin is unique among the bacterial agents of disease in man in (1) its short incubation period, (2) the severity of

symptoms produced, (3) the almost complete absence of lethal effects, and (4) its resistance to such injurious factors as drying, heat, light and aerosolization. Highly purified preparations of enterotoxin have been observed to be less resistant to heat than the crude preparations.

Staphylococcal enterotoxin is a protein having a molecular weight of $24,000 \pm 3000$ (Hibnick and Bergdoll, 1959). The enterotoxin protein is antigenic and produces antibodies which can be utilized in gel diffusion tests. More than one immunological type of enterotoxin has been demonstrated (Bergdoll, Surgalla, and Dack, 1959; Casman, 1960).

A major portion of the work which has been done to date with staphylococcal enterotoxin has been with toxin produced by the S-6 strain of staphylococci. The S-6 strain was isolated in small numbers from wholesome frozen shrimp by Dr. J. Evans in 1945 (Surgalla, Bergdoll, and Dack, 1953).

B. Agent Purification

The partial purification of enterotoxin is accomplished by precipitating the cultural supernate with H_3PO_4 , filtering, extracting the precipitate with Na_2HPO_4 , absorbing onto alumina, eluting, precipitating the eluate with cold ethanol, dialyzing, and lyophilizing. This preparation is estimated to contain ten to 20 percent enterotoxin (Bergdoll, 1956)

Further purification of the enterotoxin produced by the S-6 strain of staphylococci has been accomplished on a laboratory scale by additional adsorption on ion-exchange resin (Amberlite IRC-50 (XE-40)), eluting, precipitating with cold ethanol, dissolving the precipitate in water and lyophilizing. Additional purification by starch electrophoresis yields material of one antigenic type (Bergdoll, Sugiyama, and Dack, 1959). The purity of other lots of enterotoxin is often expressed in relation to this highly purified material.

C. Disease Produced

The disease produced is an intoxication. Not being an infection, the disease is not transmitted from one individual to another. When only the toxin is introduced into the animal body it does not increase in amount, in contrast to the behavior of living infectious agents.

D. Symptoms of the Disease

Usually, the first reaction to ingested staphylococcal enterotoxin is increased salivation. This is followed by nausea, vomiting, retching, abdominal cramps, and diarrhea (Dack, 1956). In mild cases there may be nausea and vomiting without diarrhea or there may be cramping and diarrhea without nausea and vomiting. Headache, muscular cramping, and sweating may be present in moderately severe cases. In severe

cases blood and mucus may be present in the vomitus and stools. Marked prostration is also observed in severe cases and there may be pallor, and occasionally, fever. In rare cases there may be a drop in the body temperature. The patients may also exhibit the general picture of shock. In a recent report a pregnant woman suffered convulsions (McAllister, 1959). The severity of the disease depends upon the amount of enterotoxin absorbed into the body. In the naturally occurring outbreak in U. S. Army personnel, involving 400 of 600 men, DeLay (1944) reported that about 25 percent were classified as severe or shock cases.

E. Routes of Intoxication

Normally man comes in contact with the enterotoxin by ingesting contaminated food. Rhesus monkeys and chimpanzees have been found to be susceptible to the enterotoxin by the aerosol route and it is reasonable to expect that man also will be susceptible to the enterotoxin by that route (Table I),

Table I

The ED₅₀¹ of enterotoxin² in rhesus monkeys by the intravenous and aerosol routes.

Type of response	Intravenous Route	Aerosol Route
Illness	4.0 micrograms	5.0 micrograms
Vomiting	8.5 micrograms	29.0 micrograms
LD ₅₀ ³	(not determined)	1540 micrograms

Rhesus monkeys injected intravenously with the enterotoxin were more prone to vomit and showed less depression than animals exposed to aerosols. In contrast, animals exposed to the enterotoxin by the aerosol route were less apt to vomit and generally showed more depression than those exposed by the intravenous route (Quarterly Technical Report, 1959).

F. Recovery from Intoxication

Recovery from the disease is usually rapid and complete. In the more severe cases weakness, soreness of abdominal muscles, lassitude, and loss of appetite may persist up to a week or more.

Gastroscopic examinations and examinations of biopsied tissues from the human stomach have shown marked pathological changes in the lining of the stomach following acute staphylococcal food poisoning. These changes are temporary as no abnormality was present after 92 hours (Palmer, 1951).

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1. For the purpose of this paper ED₅₀ is defined as the amount of enterotoxin which will make 50 percent of the exposed individuals ill.
 2. Assumed to be about 20 percent partially pure.
 3. LD₅₀ is defined as the amount of enterotoxin which will have a lethal effect on 50 percent of the exposed individuals.

G. Susceptibility to Intoxication

1. Human Susceptibility

All individuals are considered susceptible to staphylococcal enterotoxin. The disease occurs throughout the world, but since it is not a reportable disease there is no way of knowing the number of persons who have experienced it. The estimated number of cases that have been reported by public health and medical personnel is over a million. There are many reports of epidemics in which 100 percent of the individuals exposed to the enterotoxin became ill. Since monkeys develop a tolerance to the enterotoxin after repeated exposures, it is reasonable to assume that this also occurs in man (Surgalla, Bergdoll, and Dack, 1953). Although man may develop some tolerance to the enterotoxin as the result of numerous exposures, the resistance may be slight and readily overcome by adequate doses of the toxin, as evidenced by the high attack rates in some of the outbreaks of food poisoning and by the report of second attacks (Steede and Smith, 1954).

a. Case Mortality Rate

The case mortality rate in staphylococcal food poisoning acquired under natural conditions is very low. Although the estimated number of reported cases is more than one million, possibly eight deaths from this

disease have been reported. Among the seven fatal cases reported by Weed, et al. (1943) the data are insufficient in three instances to substantiate the interpretation that the food poisoning was due to staphylococci. The four fatal cases, in which the diagnosis of staphylococcal food poisoning was more reliable, involved young children and an elderly individual. To these must be added the fatal case of a one year old baby girl reported by Pisu and Cavallazzi (1951).

There is no way of knowing the number of fatalities in which enterotoxin was a contributing factor. For example, a middle-aged woman is reported to have died of heart disease complicated by food poisoning (California's Health, 1960) and a 65-year old woman is also reported by Mollohan (1960) to have died of cerebral hemorrhage due to severe vomiting brought on by staphylococcal food poisoning.

The possibility that death may result following exposure to a large dose of enterotoxin is indicated by the results of the work with rhesus monkeys. Only by the aerosol route has sufficient data been collected to estimate the LD₅₀ of enterotoxin. The LD₅₀ for rhesus monkeys is estimated to be 1540 micrograms as compared to an ED₅₀ of five micrograms by the same route (Quarterly Technical Report, 1959). However, it remains to be determined whether the partially purified enterotoxin was free from other staphylococcal exotoxins.

b. Incubation Period

The naturally acquired disease has an incubation period ranging from one to six hours, but usually the symptoms appear in two or three hours after ingesting the enterotoxin. The incubation period may be influenced by the size of the dose and the susceptibility of the individual, as well as the route by which the toxin is acquired.

In the case of rhesus monkeys, the incubation period has ranged from 0.4 to 2.5 hours when the enterotoxin was given by the intravenous route and from 0.7 to 2.2 hours following aerosol exposure. The action of the enterotoxin may depend upon its entering the blood stream and reaching certain centers in the nervous system. If this is the case, shorter incubation periods might follow exposure to aerosols or intravenous injections as compared to exposure by ingesting contaminated food.

It is a safe prediction that as many as 95 percent of the individuals who will show the effects of staphylococcal enterotoxin will show signs of illness within six hours after adequate exposure to the toxin (Denison 1936).

c. Duration and Degree of Illness

The acute symptoms have been reported to last from one to eight hours. Recovery is usually complete in 24 to 48 hours. In the very

severe cases it has been reported that a week or more may be required for complete recovery from the condition of extreme prostration. Denison (1936) reported that in 36 percent of the 122 cases studied by him, recovery was delayed for 25 to 48 hours. At the other extreme, 21 percent were ill for only one to four hours. Although the acute symptoms of the disease may disappear within 24 to 48 hours, such general symptoms as weakness, loss of appetite, and fatigue may persist for several days (Dack, et al., 1930).

Dack states that individuals are incapacitated while they are ill due to staphylococcal enterotoxin (personal communication).

d. Estimate of the ED₅₀

An accurate estimate of the amount of enterotoxin which will make 50 percent of the exposed individuals ill (ED₅₀) is unknown. However, man is the most susceptible animal to staphylococcal enterotoxin (Dack, 1956). Further, it is reasonable to assume that the ED₅₀ of staphylococcal enterotoxin for man by the oral route will be in the range of one to ten micrograms. As stated previously, man will probably be susceptible to the enterotoxin by the aerosol route since monkeys and chimpanzees are susceptible by that route.

2. Chimpanzee Susceptibility

The small amount of work which has been done to discover the effects of staphylococcal enterotoxin on chimpanzees indicated that these animals react similarly to man, are more sensitive to the toxin than monkeys (Macaca mulatta), and are susceptible to a degree that is probably intermediate between that of the monkey and man. The two chimpanzees that received 100 micrograms of partially purified enterotoxin orally became ill within the usual incubation period of one to two hours (Wilson, 1959).

When the effective dose of enterotoxin is calculated on the basis of body weight it is found that the chimpanzee responds to an oral dose of the order of ten micrograms of partially purified toxin (20 percent) per kilogram of body weight. About ten times that amount of enterotoxin is required for the rhesus monkey to respond.

3. Monkey Susceptibility

The current belief is that the oral or stomach tube method of feeding rhesus monkeys (Macaca mulatta) is the most practical and reliable method of assaying the effects of staphylococcal enterotoxin. However it is realized that chimpanzee and man are more sensitive and monkeys are less sensitive to the toxin by the oral route than by the aerosol or intravenous routes.

The ED₅₀ of enterotoxin by the oral route for rhesus monkeys may be assumed to be of the order of 250 micrograms, since Wilson (1959) reported that this amount of the partially purified enterotoxin made 11 of 19 animals ill. In Table I it can be seen that four micrograms by the intravenous route and five micrograms by the aerosol route made rhesus monkeys ill and 8.5 and 29.0 micrograms, respectively, by the same routes, made the animals vomit.

The data for rhesus monkeys indicate that:

The intravenous route is the most sensitive; about four micrograms of partially purified enterotoxin is the ED₅₀ to produce illness.

The aerosol route requires one to two times the intravenous dose to produce illness and seven to eight times the intravenous dose to produce vomiting.

The oral route requires about 62 times the intravenous dose.

H. Treatment of the Disease

There is no specific therapy for counteracting the reactions to staphylococcal enterotoxin. Severe vomiting and diarrhea may bring about a great loss of body fluids and disturbances of electrolyte balance. The latter may be alleviated by the parenteral administration of saline solutions. In severe cases prostration and shock may develop and additional supportive treatment may be required.

I. Prevention of the Disease

At present there is no specific means of preventing the reactions after an individual has been exposed to enterotoxin.

Work is in progress to develop a toxoid. Monkeys vaccinated with toxoid are protected from enterotoxin of the same immunological type, but not against enterotoxin of a different immunological type. At least two immunological types of enterotoxin are known.

Man and monkeys subjected to repeated exposures of enterotoxin have been observed to develop a tolerance to the enterotoxin but the tolerance is not great or of long duration.

In addition, certain tranquilizer drugs, such as perphenazine, reserpine, and chlorpromazine, have been observed to prevent vomiting in monkeys due to the enterotoxin.

An antitoxin specific for the enterotoxin is capable of protecting monkeys when given prior to exposure to the enterotoxin.

J. Discussion

The report by Baerthlein (1922) is often referred to as an indication of how serious an outbreak of food poisoning might be to military personnel during wartime. A bit of discussion is in order because this outbreak was described as being caused by Proteus vulgaris. Those familiar with the causations of food poisoning now assume, for several reasons, that this

outbreak was caused by staphylococcal enterotoxin. It is readily conceivable how Baerthlein came to the conclusion that P. vulgaris was the causative agent because this organism is widely distributed and is very easily isolated from meat products and feces. Also, at the time that the outbreak occurred (1918), staphylococci were not generally recognized as a cause of food poisoning. It was not until 1929 that the role of staphylococci in food poisoning was definitely established (Dack, et al., 1930). It must not be overlooked that Baerthlein stated that the sausage, the incriminated food, contained no organisms other than P. vulgaris and a few cocci. Moreover, it is now generally agreed that there is insufficient evidence to incriminate P. vulgaris as a causative agent of food poisoning (Neter and Farrar, 1943; Savage and White, 1925; Tanner and Tanner, 1953).

A better example of the effect of enterotoxin intoxication on a military population is given in the report by DeLay (1944) in which 400 of 600 men were made ill and 25 percent of the cases were classified as severe or shock cases. The effect of an outbreak of enterotoxin intoxication on a civilian population can be realized from the Angola, Indiana, outbreak in which 62 percent of the exposed group became ill and 81 percent of those made ill were hospitalized.

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B. Task Surprise Correspondence

In this appendix several abridged letters are reproduced to illustrate one aspect of data gathering procedures which were used in Task Surprise and which may be of use in similar investigations. In accordance with commitments to Task Surprise respondents, names and addresses have been deleted from the letters.

Dear Sir:

This summer, a staphylococcal enterotoxin food poisoning outbreak occurred at a picnic of the Johnson Company's Athletic Association.

At the University of Pennsylvania, we are investigating such events in order to relate them to important problems of national defense and civil defense. We would be most grateful for any information which your office can furnish. You may be sure that any data given to us will be treated as confidential except for reports to the U.S. Department of Defense and certain of its branches.

We have already obtained some valuable information from the Johnson Co., as well as from the citizens of Croydon and Gabriel. However, there are certain gaps and certain ambiguities in the Gabriel data with which we hope your office can help us. In addition, if your office has issued a report on the outbreak, we would be most anxious to receive copies.

Indicated below are those questions to which we require answers most urgently. We are aware that answers to all items are probably not available and that many answers will only be approximations of the facts. However, any information you can give us would be most helpful.

(1) Was staphylococcal toxin definitely identified as the substance producing illness among the picnickers?

(2) Regarding the number and classes of persons involved:

- a. How many persons ate food at the picnic?
- b. How many of those eating became ill?
- c. What information is available regarding the:
 - i. Age distributions,
 - ii. Sex distributions,
 - iii. and distributions in terms of the victims' normal state of health (We understand a number of diabetics, cardiac cases, pregnant women, etc., were involved) among affected and non-affected picnickers?

(3) How many persons were hospitalized or treated in hospitals for:

- a. 1.0 to 6.9 hours
- b. 7.0 to 12.9 hours
- c. 13.0 to 24.9 hours
- d. longer than 25.0 hours

(4) How many hospitals (please specify bed capacity) were involved in caring for the ill listed in (3)?

(5) What were the ratios of the following types of medical personnel to victims at various treatment facilities:

- a. Physicians to patients?
- b. Nurses (RN) to patients?
- c. Practical nurses, orderlies, aides and the like to patients?

(6) In what quantities, if any, did the State Board of Health or other state agencies supply the stricken communities with the following:

- a. Physicians?
- b. Nurses (RN)?
- c. Laboratory personnel?
- d. Laboratory facilities?
- e. Medicines?
- f. Bedding?
- g. Transportation facilities?
- h. Communication facilities?

(7) Did the State Board of Health or other state agencies give guidance or instructions to stricken communities on:

- a. treatment?
- b. mobilization of community facilities?

(8) What kinds of treatment were most frequently employed in coping with the food poisoning outbreak?

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(9) Please specify the most frequently used medicines, methods of administration, and whether or not shortages of certain medicines developed in the communities involved.

Please accept our sincere thanks for your efforts in this matter.

Yours very truly,

Robert G. Hayden, Ph.D.
Research Investigator

Dear Sir:

During the food poisoning emergency, your office rendered the community of Gabriel, those stricken and their families, an exceptional public service by handling 1, 417 toll calls and 20, 308 local calls with great efficiency and by refusing to charge for this service.

Your activities during this emergency are of great interest to us because we at the University of Pennsylvania are conducting a series of studies vital to the national defense of the United States. At present, we are particularly concerned with an analysis of responses to various civil emergencies and especially with the cost aspect of such emergencies. Cost estimates for services performed provide us with a rough overall criterion for measuring the intensity and extensity of the effort involved in coping with emergencies of this sort. And cost information, as you can readily appreciate, is vital for sound defense planning.

We respectfully request your assistance in our work! You can be of great help by answering the questions below to the best of your ability:

1. a. Are the figures I have given above for toll and local calls accurate? I obtained them through the kind offices of the County CD director. If they are not accurate, please estimate the total local and toll calls made for Saturday and Sunday.

Total Number of Calls:	Local	Toll
Saturday from NOON to MIDNIGHT	_____?	_____?
Sunday from 12:01 AM to NOON	_____?	_____?

- b. Please estimate the total number of local and toll calls that would probably have been made if no emergency had occurred on the above dates.

Total Number of Calls	Local	Toll
Saturday from NOON to MIDNIGHT	_____?	_____?
Sunday from 12:01 to NOON	_____?	_____?

c. Could you give us a breakdown by hours or multiples thereof for the number of local and toll calls made on Saturday and Sunday? If this is not possible, we wonder if you could give some estimates regarding the peak call periods on those dates?

Number of Calls per Hour:	Local	Toll
Saturday: NOON to 1:00 PM	___ ?	___ ?
1:00 PM to 2:00 PM	___ ?	___ ?
2:00 PM to 3:00 PM	___ ?	___ ?
3:00 PM to 4:00 PM	___ ?	___ ?
4:00 PM to 5:00 PM	___ ?	___ ?
5:00 PM to 6:00 PM	___ ?	___ ?
6:00 PM to 7:00 PM	___ ?	___ ?
7:00 PM to 8:00 PM	___ ?	___ ?
8:00 PM to 9:00 PM	___ ?	___ ?
9:00 PM to 10:00 PM	___ ?	___ ?
10:00 PM to 11:00 PM	___ ?	___ ?
11:00 PM to MIDNIGHT	___ ?	___ ?
Sunday: 12:01 AM to 1:00 AM	___ ?	___ ?
1:00 AM to 2:00 AM	___ ?	___ ?
2:00 AM to 3:00 AM	___ ?	___ ?
3:00 AM to 4:00 AM	___ ?	___ ?
4:00 AM to 5:00 AM	___ ?	___ ?
5:00 AM to 6:00 AM	___ ?	___ ?
6:00 AM to 7:00 AM	___ ?	___ ?
7:00 AM to 8:00 AM	___ ?	___ ?
8:00 AM to 9:00 AM	___ ?	___ ?
9:00 AM to 10:00 AM	___ ?	___ ?
10:00 AM to 11:00 AM	___ ?	___ ?
11:00 AM to NOON	___ ?	___ ?

2. Did telephone communications break down temporarily at any time as the result of overloading the telephone system? If so, please indicate the approximate durations of these breakdowns.

(By breakdowns, we mean inability to get an operator or dial tone for a period of longer than 10 minutes after picking up the receiver.)

3. What is the total number of telephones connected with the Gabriel switchboard?

Total number of phones _____ ?

4. What is the normal week-end staff for your office? Was it necessary to augment this staff in order to handle the increased traffic resulting from the emergency? If so, please indicate the number of persons added.

Number of Persons on Staff: ***	Normal	Added
Saturday from NOON to 8:00 PM	_____ ?	_____ ?
from 8:00 PM to MIDNIGHT	_____ ?	_____ ?
Sunday from 12:01 AM to 8:00 AM	_____ ?	_____ ?
from 8:00 AM to NOON	_____ ?	_____ ?

***BY STAFF WE MEAN TO INCLUDE THE FOLLOWING CATEGORIES OF PERSONNEL:

I Administrative and Executive; II Operators and their Supervisors; III Equipment Maintenance and Repair personnel, foremen included; IV Linemen, foremen included; and V Clerical personnel; VI Are there other categories of personnel which should be included in your opinion? If so, please indicate.

5. Please estimate, in terms of your responses to Question 1. a., the total charges that would have been applicable to customers if the normal message rates had been in force during the emergency situation.

Total Applicable Charges:	Local	Toll
Saturday from NOON to MIDNIGHT	_____ ?	_____ ?
Sunday from 12:01 AM to NOON	_____ ?	_____ ?

6. a. By what means were calls connected with the food poisoning epidemic separated from normal traffic, or was no such separation attempted? Please indicate whether or not calls were separated in this manner both Saturday and Sunday or on only one of these days.
- b. If telephone traffic was separated into emergency and routine calls, could you give the number of each type of call for both days?

Total Number of Calls:	Emergency	Routine
Saturday from NOON to MIDNIGHT		
Toll	_____?	_____?
Local	_____?	_____?
Sunday from 12:01 AM to NOON		
Toll	_____?	_____?
Local	_____?	_____?

We anticipate that you will probably not be able to answer all of the above questions in precise detail because of their broad nature and because it will be necessary to base many responses on educated guesses. However, we will value greatly any information you may be able to supply.

Incidentally, such information as you are able to give will be treated as confidential, unless you indicate otherwise, except for classified reports to U. S. government agencies and unclassified reports to pertinent CD personnel; however, the latter reports will not identify the town by name nor mention the names of respondents.

Many thanks for your assistance!

Yours very truly,

Robert G. Hayden, Ph. D.
Research Investigator

Dear Sir:

During part of the week of October 5, I was in Croydon and Gabriel looking into the food poisoning incident in order to obtain data which would be useful in drawing up plans for civil defense operations throughout the United States.

I spoke with a number of individuals who were most helpful; but most of them suggested that I contact you for expert information regarding the organization of hospital facilities and the handling of sick individuals. But, unfortunately, I was unable to mesh our schedules during my all too brief stay in the Croydon area. Consequently, I am now writing you in lieu of this visit in order to ask for your assistance in obtaining vital information regarding the events.

You may be sure that your replies, as well as those of all other individuals, will be held in the strictest confidence and that little, if any, of the data obtained will be associated with their respective sources in our reports. Much of the information will be included in confidential reports to U. S. government agencies. These reports will, of course, not be accessible to the general public. In addition, however, we are planning to make a restricted distribution of unclassified copies of our report to cognizant officials in, or connected with, civil defense organizations. We will be happy to send you such a report when available, if you express an interest. This report will not identify persons or places, but will deal with the events described in a general fashion; i. e. , the following occurred in a midwestern community of X number population etc.

We anticipate that you will not be able to answer all of the questions given below because of their broad nature and also because many replies will be based on estimates. However, we should be very grateful indeed for any information you may have. Of course, such information as you may have available should be given in terms of conditions and facilities as they existed on the weekend of the epidemic.

Information is desired regarding the following:

- (1) How many beds did the hospital have altogether?

- (2) How many of these beds were occupied before the arrival of persons stricken by food poisoning?
- (3) Altogether, what was the total number of food poisoning victims treated by the hospital?
- (4) What was the peak number of food poisoning victims the hospital accommodated at any one time?
- (5) Could you tell us something regarding the rate at which victims arrived and were discharged on both days?
- (6) How many physicians, registered nurses, and practical nurses or orderlies were available to treat victims of the food poisoning:

- a. When the first cases arrived _____?
- b. At 3 P. M. Saturday _____?
- c. At 6 P. M. Saturday _____?
- d. At 9 P. M. Saturday _____?
- e. At midnight Saturday _____?
- f. At 6 A. M. Sunday _____?
- g. At 9 A. M. Sunday _____?
- h. At noon Sunday _____?

(7) How many physicians, registered nurses, and practical nurses or orderlies above and beyond the normal hospital staff for those days were used on:

	Normal	Excess
a. Saturday	_____	_____
b. Sunday	_____	_____

(8) How many outside lay assistants were used in the hospital on:

	Normal	Excess
a. Saturday	_____	_____
b. Sunday	_____	_____

(9) Was there at any time a shortage of particular medicines or drugs or equipment employed for the treatment of the food poisoning victims?

We have in mind **here** such items as: Paregoric, Dramamine, Thorazine, Castor Oil, Demerol, Compazine, Belladonna, Barbiturates, I. V. Dextrose, I. V. Normal Saline, Pectin, Dipyrone, APC, Analgesics, stethoscopes, hypodermic syringes and needles, sphygmomanometers, etc.

a. Please list those medicines and drugs which were exhausted but which could not be or were not replenished during the emergency.

b. Please list those medicines and drugs which were exhausted but which were replenished during the emergency.

(10) Please list the 5 most frequently used medications in treating the food poisoning victims.

(11) Please give an estimate of the number of persons treated by the intravenous administration of dextrose or saline solutions. _____

a. What proportion of the total number of persons did these individuals constitute _____?

(12) Was oxygen administered to any of the food poisoning victims?

a. If so, how many _____?

b. What proportion of the total number of patients treated did these persons constitute _____?

(13) One of the most important considerations for sound civil defense planning is the estimation of costs for various types of emergency operations. Consequently, it would be of immense value to us, if you, as an experienced hospital administrator, could provide a rough estimate of the overall expenses entailed by treatment of the food poisoning victims. By this we mean expenses above those incurred by normal hospital operations for this period.

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In giving the estimate, please do not deduct any financial or material reimbursements the hospital may have received subsequently; in addition, the estimate should incorporate a sum representing the expenses that would have been incurred if volunteer aid given by physicians, nurses, lay personnel, etc., had to be paid for by the hospital at the going rate.

Please accept my sincere thanks for your assistance in this matter.

Yours very truly,

Robert G. Hayden, Ph.D.
Research Investigator