

THE FIELD APPLICATION OF THE "SUGGESTED PROCEDURES FOR THE INVESTIGATION OF FOODBORNE DISEASE OUTBREAKS"^{1 2}

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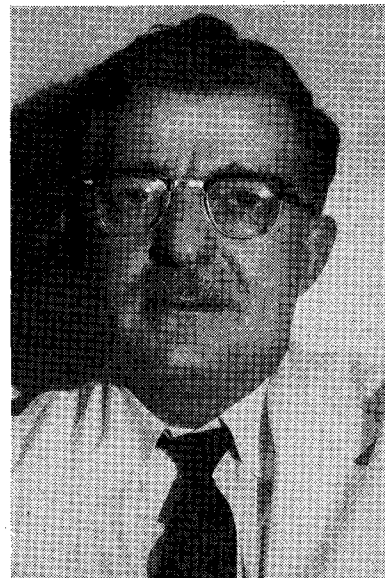
Let us begin this discussion by reviewing the purposes and uses of investigations of outbreaks. It is worthwhile to do this because, in reviewing reports of many investigations, we get the impression that the investigators frequently have not had clearly in mind the objective of the investigation.

The ultimate purpose of an investigation is to determine *how* food materials become contaminated, in order to use this information to prevent a repetition of the same set of circumstances. A means toward this end is the location and identification of the causative agent and vehicle of transmission. But this is only a preliminary step in the procedure — it is not the final goal. Too frequently investigators do not attempt to learn just *how* and when the food became contaminated, nor do they take full advantage of the use of the incident as a teaching tool to prevent similar outbreaks in the future.

ADDITIONAL VALUES TO BE OBTAINED FROM INVESTIGATION

Outbreaks of disease are unusual and dramatic. The general public is keenly interested in matters affecting health. An outbreak of disease is news, and newspapers, radio and TV are alert to report such news. After it is reported, the public wants to know what happened and what is being done about it. People pay taxes to support health departments with the expectation that public health workers will insure that proper measures are taken to protect them against such health hazards as food-borne disease.

There are times when health officials need evidence to support the enactment of ordinances or regulations designed to eliminate or minimize potentially hazardous conditions or practices in the preparation, storage, or service of food. Evidence collected locally (or within the state) is much more effective in convincing those who need to be convinced, than is evidence



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cited from textbooks of circumstances reported from far-off places. So it is important to obtain complete and reliable records of outbreaks which can be used for this purpose. The health department will not be able to give the community the type of service and protection it expects if outbreaks are not investigated properly and thoroughly.

DETAILS OF OPERATIONAL PROCEDURES

Reporting of food-borne disease

In investigations of outbreaks of food-borne disease, time is an exceedingly important and often critical factor. It is important to obtain specimens for laboratory examination while such specimens are still available and in proper condition. Furthermore, information obtained early after the development of the outbreak is apt to be more reliable than that obtained after a considerable lapse of time. Also, it is oc-

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²The manual *Suggested Procedure for the Investigation of Food-borne Disease Outbreaks* which has been prepared by the Committee on Communicable Diseases affecting Man, INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., is now in editorial process. Copies will be available soon at the ASSOCIATION offices in Shelbyville, Indiana.

asionally possible, through early intervention, to prevent additional cases from developing.

When and how do health departments usually learn that an outbreak has occurred? Too frequently the news reaches them several days after the event. There are many and complex reasons why the health department is not notified of such outbreaks as soon as they are recognized. It does require a certain amount of time after an outbreak occurs for it to become recognized as such. Physicians may be called to attend persons who have become ill with food poisoning but if they see only one or two isolated cases they may not even suspect food-borne disease. A physician's first and immediate concern is the care of his patients, and even after the physician suspects that he is dealing with food-borne disease, the health department is not automatically the first thing that comes to his mind.

Therefore, health departments must remain alert to obtain reports of outbreaks from all possible sources, including physicians, hospitals, news agencies, or any other reliable source of information. Even rumors of outbreaks should be checked. In public health, it is not unusual to discover situations which would have passed unnoticed if a special effort had not been made to find them.

One last comment about reporting: It is not surprising that outbreaks frequently occur during holidays or week-ends. That is when people celebrate by indulging in picnics or special dinners. At such times, someone may attempt to reach health department workers to report an outbreak or to request assistance but may not be able to do so because of inability to locate members of the health department staff. The health department must have a well established policy and procedure whereby telephone operators will always know where the key personnel may be reached — and such members of the staff must keep designated persons informed of their whereabouts.

Being ready and prepared to carry on an investigation

Let us now assume that the health department has been notified that an outbreak of food poisoning has occurred. How does the investigation get under way? Does each member of the staff have a good understanding of the responsibilities each is to cover? Is the staff organized to proceed intelligently and cooperatively? Are the working tools available and ready — meaning laboratory specimen containers, instruments for obtaining specimens, thermometers, and the various history and record forms. Above all, is the captain of the team prepared to direct the operation?

The first step to take in an investigation is to be prepared to go into operation. It is necessary to have

one person in charge to whom all will report, and who has authority to direct others. Of course, the person in charge must have sufficient knowledge of the general epidemiology of food-borne diseases to be able to give intelligent direction. This means that he must be well acquainted with the clinical characteristics of diseases caused by the various agents usually responsible for such outbreaks, including particularly the length of the incubation periods of each, as well as the possible avenues of transmission and other characteristics produced by each particular causative agent.

While this appears to be a formidable amount of information, it is quite readily available in handy form, such as in the handbook on the *Control of Communicable Diseases in Man* published by the American Public Health Association, as well as the booklet under discussion here (see Part V — Classification of Illnesses Attributable to Foods).

Investigation must begin on the basis of information that is obtained usually at the time the report of the outbreak is received, which usually includes such information as the location of the outbreak, approximately when the suspected food or drink was consumed; roughly, how many people were involved, and the general nature of the illness produced. Whoever answers the telephone to receive a report of an outbreak should attempt to obtain this information from the person reporting it.

As soon as sufficient additional information is obtained in regard to the chief symptoms of some of the patients, and the approximate incubation period, a tentative working diagnosis should be made which will delineate the approach to the problem; that is, it should be tentatively decided that the outbreak may be due to chemical poisoning, botulism, staphylococcal intoxication, food infection, or some other type of agent.

On the basis of this much information, assignments of specific tasks should be made.

Selecting and obtaining laboratory specimens

Of course, one of the first things to be done is to get to the premises where the common exposure took place to obtain as quickly as possible specimens of material for laboratory examination. Comment is in order in regard to the importance of the type, condition, and manner of collection of laboratory specimens.

It is best to obtain samples from the containers from which the suspected food was originally served. Sometimes it is necessary to take the container itself, or to obtain food scraps from plates upon which served. If samples of food from the serving containers or dishes are not available, the next best specimen is a

sample of food prepared in the same manner at the same time. In any case, the record of the sample should include a detailed statement of its source.

It is better to obtain too many samples than to neglect to take some because of apparent lack of significant possibilities. Final selection of samples to be examined can best be made later in consultation with the laboratory worker. If specimens of doubtful value are picked up, be sure to advise the laboratory technician of your opinion as to which specimens are most likely to yield helpful results. It may not be necessary to examine all specimens brought in, so it is well to establish a priority of importance.

Sometimes rather large food items are involved, such as a large ham or carcass of a turkey. It is better to bring in the entire specimen and let the laboratory worker select the sample for examination. If specimens are in small containers or packages, it is advisable to take the entire sample in its original container.

In obtaining the samples, it is imperative to take every precaution to avoid cross contamination from one specimen to another, or to add contamination through handling. Specimens must be handled with sterile instruments, and after an instrument, such as a knife, spoon, or forceps has been in contact with one sample, it cannot be used for another without re-sterilization. One way to re-sterilize such instruments in the field is to wipe them with alcohol and then flame the surfaces that will come in contact with the food items.

If the suspected food is canned, ascertain whether home or commercially canned. If home processed, attempt to obtain the exact method used in canning. If a pressure cooker was used, have the steam gauge tested (County Extension Agent may be of help here). If commercially canned, get brand and lot number. If possible, obtain part of a used can. If not available, get a sample from a lot prepared at the same time.

Particularly in the case of suspected chemical poisoning, or where legal action is apt to be likely, samples picked up must be properly labelled and sealed in the presence of witnesses, who should be asked to acknowledge that the specimen is authentic.

Refrigeration of Specimens for Bacteriological Examination

If more than an hour or two will elapse between the time the samples are obtained and the time they can be delivered to the laboratory, the samples must be kept refrigerated at a temperature not exceeding 50°F. This can best be accomplished by placing the specimens in an insulated carrying box, such as the

popular picnic lunch coolers, which, of course, must also contain a refrigerant, such as ice or the convenient frozen jel-packs generally available in sporting goods stores.

If specimens must be shipped to a central laboratory, it is necessary to ship them under refrigeration in order to obtain approximate quantitative estimations of the number of organisms present.

Supplies and Equipment needed

Each health department should have ready and accessible for immediate use, a kit of equipment and supplies prepared to use in the investigation. Such a kit should include the following items:

- a. Six sterile wide-mouth glass jars, 4-6 oz. capacity, with screw cap.
- b. Two sterile 1-quart mason jars with caps.
- c. A sharp knife (butcher knife) wrapped, labeled and sterilized.
- d. Three tablespoons, wrapped, labeled and sterilized.
- e. One or more pair of forceps or tongs, wrapped, labeled, and sterilized.
- f. 4-oz. bottle of alcohol.
- g. Alcohol lamp.
- h. A dozen individually wrapped, sterile cotton swabs, with a dozen screw-capped tubes each containing about 5 ml. of sterile saline solution for making swab rinse suspensions.
- i. Heavy wrapping paper, folded and wrapped in an outer cover and sterilized, to be used for covering and transporting large items, such as the carcass of a roasted turkey or a ham.
- j. Two or three water specimen bottles.
- k. A roll of ½ inch wide adhesive tape.
- l. Thermometer for checking temperature of refrigerator, etc.
- m. Wax pencil.
- n. Paper towels (sterile and wrapped).
- o. An insulated chest in which to transport samples under refrigeration.
- p. Supply of all the forms needed upon which to record the information obtained and to identify the specimens for laboratory examinations.

Admittedly, the above is a rather comprehensive and somewhat formidable list of supplies and it is probable that such a complete outfit would not be needed on some occasions; nevertheless, having such a kit ready for use should be conducive to carrying out more thorough and, therefore, more useful investigations.

Recording the findings of the investigation

The contents and use of record forms deserve detailed consideration. In the first place, it is difficult to draw up a form that is effectively applicable to all outbreaks because the circumstances vary so much from one outbreak to another. If the element of time were not so critical in most investigations, record forms could be drawn up and prepared to fit the particular circumstances involved. Since this is usually not practicable, or because it is more convenient to have necessary forms ready for immediate use, many health departments have developed general forms for this purpose, and it might be added that practically no one is ever completely satisfied with a form that someone else has composed.

The following is a list of the functions and values of investigation record forms:

- a. The forms provide a means of systematically recording the circumstances relating to the outbreak and from this may be prepared an official report of the incident, which also serves as evidence that an investigation was actually made.
- b. The forms provide a guide to the investigator as well as a checklist of items to be observed.
- c. The quality of the information and the completeness of the record furnish an indication of the thoroughness or the superficiality of the investigation. Many state health departments rely upon such records to determine how well the local health department has fulfilled its responsibility. If a thorough investigation has been made but poorly recorded, the records will be misleading.

From time to time long-range studies are made of compiled records to obtain an over-all view of the problems of food-borne disease and to discover areas needing more attention or changes in procedure. If the reports of outbreaks are incomplete or poorly prepared, the use of valuable information is lost.

It is helpful and convenient to record the findings of investigations on several types of forms. Generally, one type of form is used to record information about persons who participated in the common event leading to the outbreak; on this form are recorded the symptoms and incubation period of the illness, the food items consumed and the results of laboratory examinations of the persons. Another type of form is generally used to record the status of sanitation on the premises involved, as well as the history of the source, preparation, storage and service of the various food items, a list of the food handlers and their respective responsibilities, plus the results of laboratory examinations of suspected food items and specimens obtained from food handlers. It is useful to have a special form for use in identifying laboratory specimens and to furnish information or instructions to the laboratory.

In addition to these forms, it is helpful to have work sheets that can be used to cross-check illness against the various food items, and finally a summary tabulation form upon which the findings of the investigation may be summarized, both in tabular and narrative form, with a statement of the epidemiologic conclusions indicating the causative agent and vehicle of transmission, the probable manner in which the food was contaminated and the probable source of the contamination.

In the booklet *Suggested Procedures for the Investigation of Food-borne Disease Outbreaks* illustrations of model forms that may be used to record and summarize the findings of outbreaks are presented. Undoubtedly much work and thought has been devoted to the preparation of these forms. However, from our own experience in attempts to use these forms to record the findings of several outbreaks, we found it desirable to make extensive revisions of each of them to conform more closely to practices and procedures followed in this state.³ If anyone is interested, we will be glad to make copies of our revisions available.

Development of skill in investigation

The success or failure of an investigation depends a good deal upon the skill of the investigators and the direction they receive (if a number of persons are involved in carrying on the investigation). Some persons are endowed with natural ability which helps to make them good investigators — most of us have to develop this talent. To be a successful investigator, the following characteristics are needed: (a) interest in and curiosity about the problem, (b) ability to observe keenly, (c) the ability to imagine situations and sequences, (d) ability to think systematically and clearly, above all, (e) persistence and determination to obtain the evidence to support a thesis. Following are a few suggestions that may improve the skill of the investigator.

Before questioning people, the investigator should put his informant at ease by establishing a friendly confidence or rapport. Explain why you wish to question the person. Be at ease yourself. Don't talk too much, but be prepared to do some listening. Be patient. People frequently tell much that is not related to the investigation, but let them tell their story. However, to save time and to get to the information that is being sought, guide the person's conversation with occasional pertinent questions. Help to fix dates or time of day by relating them to incidents in their life or of the community.

³Forms originally included in the "Manual" have been revised.

It is quite likely that the stories obtained from a number of persons will differ in detail. Don't assume that the first story you get is entirely accurate, especially if the information comes second-hand. Check and recheck stories with persons who have been involved in one way or another. Be careful to word your questions in a way that will not be too suggestive of the answer that fits your suspicion. Be careful not to ask questions that are answered too readily with a "yes" or "no" — and don't accept such answers too readily — persist by changing the question or repeating it later.

Don't be discouraged if first attempts do not solve the problem. Keep thinking over the circumstances, discuss the matter with your colleagues, requestion persons involved, and attempt to obtain a perspective view of the situation.

It is important to point out an error in sampling that is frequently made; namely, that only persons who have become ill are interviewed, or at least too few of the persons are interviewed who participated in the common event but did not become ill. Fortunately, this error may be corrected by locating and questioning more persons involved. How many persons should be interviewed to obtain a representative and significant sample of findings? We have used the following rule of thumb to determine this: In outbreaks where twenty or less persons are involved, an attempt should be made to question all of them; if the number of persons is about 50, we suggest that about half of them be questioned, dividing the number roughly into equal numbers of those who became ill and those who did not become ill. When the number of exposed reaches 100 or more, we feel the sample should be equal to approximately 25 per cent of them.

Finding the real "cause" of the outbreak

The practice of carrying out rather superficial investigations of outbreaks should be discouraged. The results of such investigations are misleading and frequently useless. Again, all of the emphasis should not be placed upon finding the causative agent and the vehicle of transmission; but more emphasis should be placed upon determining *how* the food was contaminated and who or what was the source of the contamination.

Most frequently *a person* is involved in introducing the causative agent into the food or drink that has served as the vehicle of transmission. If the causative agent is bacterial, the bacteria usually have originated

from a person — sometimes directly from a skin, nose or throat or intestinal infection. How did the person transfer his infection, and what might have been done to prevent this transfer? Sometimes a person is involved indirectly — as when the procedure for dressing poultry is such that organisms from infected poultry are spread over cutting blocks, knives, and other kitchen equipment. Even where water or milk are the sources of disease, the investigator has not completed his assignment until he has obtained the evidence to demonstrate where, when, and how the vehicle was contaminated.

Demonstration of sources of infection usually requires physical examination and appropriate laboratory studies of suspected persons.

SUMMARY AND CONCLUSIONS

1. The purpose of an investigation is to determine *how* food materials become contaminated in order to use this information to prevent the occurrence of similar incidents. In order to determine who or what was the source of contamination, it is necessary to continue the investigation beyond the point of identifying the causative agent and the vehicle of transmission. Most frequently this requires the demonstration of infection in a person.

2. The value of findings of thorough and complete investigations depends upon obtaining a proper and complete record. Good record forms provide the means of systematically recording the circumstances involved in an outbreak, and serve also as a guide to the investigator, a check-list of observations to be made and a permanent record of data that is then available for future use.

Record forms should be flexible to enable them to be adapted to each outbreak.

3. Investigations may be facilitated in the following ways:

- a. By stimulating all concerned to make prompt reports of outbreaks, being sure that the mechanics of reporting is well understood by the public and that key personnel of the health department can be reached at all times.

- b. By being properly prepared to carry on an investigation by having a good understanding of the epidemiology of the various types of food-borne disease, by having ready and available the equipment and materials that will be needed, and by having the investigation team organized, trained, and under competent direction.