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Community-Wide Chest X-ray Survey

II. Nursing

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When a community-wide chest X-ray survey begins, one of the first considerations is how to plan and provide for nursing service. This question is with the survey planners when the first estimate of the city's strengths and weaknesses in tuberculosis control is made, and the solutions that are found have to be such that they will carry through a long period of follow-up, perhaps a year after the last 70-mm. film has been taken by the Public Health Service units. In our participation in such surveys in 12 large cities,[1] experience has defined a number of common questions and suggested certain effective actions. Because no two cities in the United States have the same policies, or combination of facilities, however, it is necessary to write out broad specifications which could apply in any city of 100,000 or more people. Plans for nursing in each community-wide survey must be adapted to the needs of the particular area, to the facilities and personnel available, and to the established regulations and policies. But the nursing needs are basically alike everywhere, and so certain generalizations apply to any situation.

The emphasis in our discussion of nursing in a community-wide survey will be on public health nursing in the health department. The health department is one of the three vital sponsors of the survey. The director of nursing in the health department works with other nurses and agencies in the community in this undertaking.

The question which inevitably comes up when a survey is being planned is whether the existing nursing services can be stretched to meet the needs the survey will bring to light. People in local health

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[1] For a general description of such surveys see "Community-Wide Chest X-ray Survey—Introduction." Pub. Health Rep. 65: 1277-1291 (October 6) 1950.

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departments have usually had experience with mass chest X-ray surveys conducted in schools, industries, or certain areas of their jurisdictions. They know what the nursing service demands are when thousands or even tens of thousands of X-rays are taken. In estimating the demands of a community-wide survey, however, they would be mistaken in assuming, on the basis of simple mathematics, that it requires 10 times as much nursing time if 100,000 people have small X-rays as it would if 10,000 people were X-rayed. In a number of ways, the survey operation saves nursing time and cuts down the total requirement.

1. The time of nurses in a survey is used entirely for nursing service, since they are relieved of tasks which under ordinary circumstances may cut into their professional time. They do not have the responsibility of getting the people to the X-ray unit for the first film. The survey organization is equipped to do this job, and the health educators take full responsibility for carrying it through. Furthermore, the survey organization is staffed with records personnel, including supervisors and clerks, who handle records and reports, notify patients, physicians, and clinics, and make appointments.

2. The dependable routine established in the survey organization moves with the efficiency of the assembly line, but paradoxically allows the nurse to give more individual attention where it is needed and under the best circumstances. In the normal order of events, the small films are read and notifications are mailed within 2 weeks after they are taken. Thus, people have not lost, by the time they receive the letter advising the second film, all of the original motivation which made them have the 70-mm. film. They are given specific appointments for the second film, and over 80 percent of them keep their appointments. Whatever the reason for this response, whether it is the impetus of the community-wide project or the fact of the definite appointment, it reduces excessive demands for home nursing visits during the survey. Referrals of patients from the retake center to physicians or clinics are also handled promptly so that public health nurses will need to use a minimum of time in checking to see whether physicians or clinics have received reports.

3. The thinking and planning back of the survey is cooperative and cuts across the boundaries of agencies and professions. Early planning looks at the tuberculosis problem in its entirety and seeks ways of coping with it more effectively. Through committees of the professional services division, professional workers (physicians, nurses, social workers, etc.) consider joint action of health and social agencies for improving service to tuberculosis patients and their families. They may work out better systems of interagency referrals and clarifications of the areas of responsibility of agencies and institutions to avoid duplication in nursing services.

4. The interest in tuberculosis which is created by the survey can be capitalized on by nursing. Primarily, it may result in actual increase of funds available for tuberculosis control. But even when that is not the case, there are other advantages. For example, the physicians in the community have been made keenly aware of tuberculosis and the health department's methods of controlling it, so that they understand what the public health nurse does and can give her the information about patients which she needs from them. The health and social agencies to which she may refer patients are more tuberculosis-conscious. The nursing profession, itself, through the nursing committee of the survey (see p. 1580), has had its interest in tuberculosis and the survey stimulated, and its knowledge about the disease and its control refreshed.

5. The nursing activities of the survey are carefully coordinated through the health department director of nurses and tuberculosis nursing consultants from the Public Health Service and the State and local health departments. Their functions will be discussed later in detail.

How Can Nursing Service Be Provided?

Most generalized public health nursing services are carrying a heavy case load under normal circumstances. Many hospitals are understaffed with nurses, and this may be true in tuberculosis sanatoria. It seems reasonable to say that sufficient facilities are seldom available to provide complete care for every tuberculosis patient. This problem is not created by a survey, but it is naturally revealed promptly by the number of persons needing care who are found by the community-wide undertaking. By carefully anticipating the sudden increase in services required, however, and by making adjustments in existing programs, the nursing directors and others responsible for nursing services in survey cities can plan for the best possible use of personnel and facilities.

We have found that the question of how nursing can be provided falls roughly into two sections: (1) What steps can the health department take to expand existing resources? (2) What determines the amount of nursing time that will be needed? It will be taken up, therefore, under these two headings, with full realization that there will be overlapping.

Steps to Expand Existing Nursing Resources

In planning for increasing the amount of nursing time available for tuberculosis during and following the survey, the health department has four possibilities to consider: temporary adjustments in health department programs to allow more time for tuberculosis; revision

of policies which govern nursing practices; increased assistance from other agencies in the community which give nursing service; employment of additional nurses.

1. Since any adjustments which are made in health department programs affect other phases of the public health effort, it is important for the entire staff to be consulted and oriented to the immediate needs of this program. By looking ahead, other divisions are frequently able to alter their routine so that nursing time can be relinquished temporarily for the concentrated tuberculosis case-finding program. Some commitments are constant and cannot be interrupted. Others are not jeopardized by being put aside for a short period of time if plans are made well in advance. For example, in one city, the director of acute communicable disease control changed the schedule of immunization clinics so that they would be completed before the survey was begun. In preparation for another survey, classes for expectant mothers were begun, to cut down the number of prenatal home visits which otherwise would be required. Sometimes changes which are made to allow more nursing time for tuberculosis during the survey result in improvements in the whole program.

2. In the process of evaluation of the tuberculosis control program which is done in preparing for a survey and of the rules which are followed in selection of cases for clinic and field nursing supervision, the health department is often able to revise practices so that some types of cases can be dismissed. For instance, adult contacts of tuberculosis patients can be referred to the survey except in unusual circumstances.

In line with the new policies, analysis of the home nursing case load determines which cases can be dismissed or have visits at longer intervals, and which should have more frequent visits. Here, the judgment of the individual nurse is of great importance. The decision cannot be made entirely on the basis of the patient's physical status. Conditions in his home and his family's ability and inclination to assume responsibility must also enter into the consideration.

3. It is usual for nurses in the health department to have a close working relationship with the Visiting Nurse Association, the Board of Education nurses, and with other agencies which give public health nursing service. When the plan for a survey is taking shape, these agencies enter into the community preparations, and, frequently, they are able to contribute nursing services for the survey. School nurses have helped in some surveys by taking on the job of making home visits to people who fail to return to the retake center. Industrial nurses sometimes can give this kind of service as well. The Visiting Nurse Association sometimes agrees to care for all or selected tuberculosis patients found in the survey who need bedside care.

4. The addition of nurses to the staff to fill survey needs depends, of course, upon budget considerations. It is not always possible for health departments to obtain funds for this purpose, but in four cities additional permanent nursing positions have been approved during or following community-wide surveys. Public interest in the survey makes it easier for the authorities to obtain increased budgets. Occasionally an interested voluntary agency will pay the salaries of nurses for a period that will cover the special increase in nursing services needed as a result of the survey. The Hennepin County Tuberculosis Association paid the salaries of eight nurses who were assigned to the health department in Minneapolis for more than a year during and following the survey.

Determining the Amount of Nursing Time Needed

It is natural that the health officer and the director of nursing in a city where a survey is to be held would want to know in advance how much of an increase in nursing time the survey will make necessary. On the basis of previous experiences, we are able to predict with a fair degree of certainty the number of nurses who will be needed in the retake center and for how long a time. Let us take a city of about 150,000 people where we could expect to take 100,000 70-mm. films. Let us assume that the policy decided upon will be to recall to the retake center for 14″ x 17″ films all persons whose small films show evidence or suspected evidence of tuberculosis, cardiac abnormality, or other chest disease. We shall also assume that eighteen 70-mm. units will be in operation for 3½ weeks, and that the retake center will be in full operation 2 weeks after the beginning and remain open 3 weeks after the end of the 70-mm. operation, a total of 4½ weeks, or about 22 working days. An average interview takes 15 minutes and so a nurse can do 25 a day. On these assumptions, our estimate would be as follows:

a. 70-mm. films expected	100,000
b. 14″ x 17″ films expected: 3.2 percent of a. (average recalls of previous surveys)	3,200
c. 14″ x 17″ films per day: b÷22 days of operation	145
d. Nurses required for center: c÷25 appointments per day	6

Predicting the increase in nursing service that will be required in the health department chest clinic, in field nursing, and in the sanatorium cannot be done in any similar way, since there are a large number or variables to be considered. These variables are not only the available staff and physical facilities, but the local health department regulations and policies, and the practices decided upon by the sponsors of the survey. Listing some of them will perhaps serve as a guide to the type of thing that should be considered in planning for nursing service:

1. Staff and physical factors.

a. How many nurses are there in the generalized public health nursing service of the health department? On the Visiting Nurse Association staff, the school health service, and so forth?

b. What is the staffing pattern in the tuberculosis sanatorium?

c. What voluntary assistance can be called upon from nurses' aides, or from members of professional nursing organizations?

d. Does the health department operate a full-time chest clinic, or are certain days given over to tuberculosis in a general clinic? How many patients can the clinic serve in a day at its greatest capacity?

e. Is there a diagnostic clinic, or do survey plans include the establishment of one?

f. How large is the geographic area which field nurses must cover?

g. How many beds are available in the sanatorium, and is there any plan to open up new beds for survey patients?

2. Health department practices.

In the planning of a survey, the practices of the health department which have to do with tuberculosis are reviewed critically, and sometimes they are revised to provide for more efficient service in nursing as well as in other aspects of tuberculosis control. The established regulations continue in effect during the survey; diagnosed cases of tuberculosis must be reported to the health department and arrangements made for the isolation of those who may endanger the public health. If definite policies do not already exist as to what responsibility the health department will take for the isolation of open cases, these should be determined before the beginning of the survey. When definite rules exist for procedures like visits by a public health nurse to all patients diagnosed as having tuberculosis, they will still be followed unless changes are decided upon.

3. Medical and public health policies of the survey.

In the early conferences of survey sponsors, the health department and the medical society set up certain policies which have a great bearing not only on the number of nurses who will be needed, but upon the services they will give. It is exceedingly important for a nurse to have a part in this planning; the best situation is where the nursing consultant attends the medical policies committee meetings, so that she can know what plans are developed and also discuss with the committee their practicability in terms of the nursing service available. Some examples of the kind of questions on which policy is established are:

a. Will public health nursing services be made available to the patients of private physicians? If so, will such service be given routinely to all cases, or on request, or only to "open" cases?

b. Will patients be referred to private physicians after the 14" x

17" X-ray or will it be routine to refer them after an examination for tuberculosis which includes laboratory diagnosis?

c. What priorities will be given in clinic and home supervision to: (1) persons who have been diagnosed as having tuberculosis; (2) persons whose X-rays suggest abnormal chest conditions and who are awaiting diagnosis; (3) contacts of tuberculosis patients; (4) patients who have been discharged from tuberculosis hospitals; (5) diagnosed cases and suspects who are not under medical supervision?

d. What responsibility will be taken for clinic and public health nursing supervision of persons who are found to have abnormalities of the chest other than suspected tuberculosis?

e. What special services will be given to persons whose 70-mm. films are interpreted as indicating urgent need for follow-up? Will nursing visits be used to bring such patients under immediate medical care?

f. When sanatorium beds are not available for all patients for whom hospitalization is recommended, what will be the basis for the selection of patients to go to the sanatorium? Since the service given in the home varies with the type of case, it is important in planning for nursing time to know what kind of case is to be given service.

g. Will clinic nurses be called upon to secure gastric specimens?

h. What will determine the dismissal of cases from the clinic?

i. What will be the procedure with regard to the supervision of contacts of tuberculosis patients?

j. To what extent will public health nursing visits be made to persons who fail to keep appointments at the retake center and/or the clinic?

The director of nurses and the tuberculosis nursing consultants must know what medical policies are made in order to plan in advance for the nursing service that will be required. If they also have a part in shaping policies, they can be of great assistance in interpreting the implications for nursing and in helping to make decisions which will insure the best possible nursing service with the available staff.

Direct Nursing Service in the Survey

Nurses have demonstrated their interest in surveys through participation, along with other citizens in the community, in the general organization. Professionally, they participate in the survey organization through the nursing committee, and in all fields of employment they give direct service to persons who are discovered by the survey. Nurses in most health agencies and institutions give more than the usual amount of time to tuberculosis during the survey and for some time after it is completed. Public health nurses in the

health department continue to give service in the clinic and nursing supervision to patients in the home; they are directly in charge of the retake center which is a part of the survey operation.

We will describe the membership and functions of the nursing committee, the duties of the nursing consultants who work on survey problems, the operation of the retake center, and the implications of the survey for regular clinic and field nursing in the health department.

The Nursing Committee

Although it does not take direct responsibility for any of the nursing service which is given to persons who are X-rayed, the nursing committee of the survey gives valuable assistance to the enterprise in sharpening professional interest in tuberculosis and its control, and representing the profession in the survey organization. It is a part of the professional services division, one of the three major divisions of most survey organizations.[2]

In most cities, the nursing directors of agencies in the community—the health department, the Visiting Nurse Association, tuberculosis hospital, and so forth—make up the nucleus of the committee. In order to be fully effective, the committee should have representation from all areas of nursing: local professional organizations, hospitals (both tuberculosis and general), clinics, official and voluntary public health nursing agencies, industrial, school health service, doctor's office, general duty and private duty nursing, nursing education, and schools for practical nursing.

When the committee selects its chairman, the important qualifications to consider are a keen interest in community activities, a genuine desire to have the nursing profession carry its full share of the survey's work, and knowledge of public health nursing in the community. Since the chairman takes part in the deliberations of the professional services division, she should be a person who can contribute toward plans which will be realistic in terms of the community's nursing resources and can judge which matters should be brought to the attention of the health department director of nursing, who is responsible for nursing services to persons X-rayed in the survey.

Quite naturally, the role of the nursing committee varies in different cities, but usually its three major contributions are in helping to recruit nurses for tuberculosis hospitals and the health department, in arranging for the participation of nurses as citizens in the total survey effort, and in arousing the attention of nurses in all fields of employment to the community's tuberculosis problem and adding to or refreshing their knowledge about the disease and its control.

The content of educational programs also varies in communities, but usually it includes discussion of the epidemiology and newer

[2] The other two are the community participation and finance divisions.

methods of diagnosis and treatment of tuberculosis, the social, economic, and emotional problems and needs of tuberculosis patients and their families, and provisions for after care and rehabilitation. Specialists in the medical, nursing, and social work fields have made important contributions to the discussions.

The Public Health Service Consultant

It seems appropriate to make brief mention of the Public Health Service nursing consultant who participates with other members of the Public Health Service survey team in early planning and in the operation of the program. She serves as an advisor to the health department and other sponsoring agencies on the nursing phases of the program. She works closely with the medical-officer-in-charge of the Public Health Service survey team and with the medical committee when plans for follow-up are under consideration. In planning for increased nursing time for tuberculosis, she gives consultation to the director of nurses in the health department, and, from experience in previous surveys, she works with the survey and the health department in arranging the layout of the retake center, selecting its staff, developing procedures, and operating the center. The nursing committee can call upon her for advice in selecting a chairman and setting up a program. In some surveys, she remains in the community throughout the operation of the program while in others she makes only periodic visits.

The Local Tuberculosis Nursing Consultant

A number of the health departments in cities where community-wide surveys have been held have had full-time tuberculosis nursing consultants on the staff before the survey was planned. If the position has not already been set up and filled in the local health department, arrangements have been made for it for at least 6 months before and about a year following the 70-mm. film-taking operation. Sometimes one of the supervisors in the generalized nursing program has been assigned to this post; in other cities, either the State health department or the Public Health Service has lent to the city a tuberculosis nursing consultant, who becomes a member of the health department staff.

The local tuberculosis nursing consultant works with the director of nursing, the tuberculosis control officer, and others to plan and administer an effective tuberculosis nursing service. Because the accelerated case-finding program increases the need for tuberculosis nursing, the local consultant has intensive work to do in preparing the health department nurses for taking on the increased tuberculosis case load and in extending and improving nursing services for tuberculosis patients and their families.

When health department practices are reviewed with an eye to possible adjustments that will provide more nursing time for tuberculosis, the local consultant works with the nursing director, supervisors, and staff nurses in seeking ways to provide care for the number of new patients anticipated. The general organization of the retake center is in her charge. When the personnel needs of the center have been defined, and plans for the necessary assignments have been made, she and the Public Health Service consultant give the necessary orientation to nurses who are assigned to the center. She works with the survey staff in setting up record and referral systems which can be coordinated with those of the health department, and with both the survey and the health department staff in scheduling appointments at the health department chest clinic.

A health department nursing staff education program is usually undertaken when a survey is planned. Its objective is to acquaint the nurses with the survey aims, organization, and procedures, and to bring them up to date about tuberculosis case finding, treatment, and continuation care. The consultant works with the director of nurses and others in the health department in arranging this program.

In some health departments, special committees made up of nurses on the staff have studied the existing home and clinic nursing procedures and made suggestions for changes in line with recent developments brought out by the educational program. These committees sometimes develop methods that are better than those in use, and their contribution is of lasting value to the city's tuberculosis control program.

Nursing in the Retake Center

Before taking up the assignment of nurses to the center and their duties, we shall give some background to show the importance of the retake center in the survey and to describe how it operates.

When the 70-mm. films taken at the X-ray units placed throughout the city are read, the matching basic survey record cards are marked by the Public Health Service physicians with symbols indicating that the films are essentially negative or that they show evidence of suspected tuberculosis, cardiac abnormality, or other chest pathology. The cards are then sent to the survey records room where the return addressed portions of those marked negative are detached and mailed. The records staff sends letters to persons whose cards contain the symbols indicating that the films were suspicious of abnormality. These letters explain that a second X-ray is recommended and give specific appointments for X-rays at the retake center. In most cities, the medical committee establishes a policy governing the prompt referral to physicians or clinics of persons whose films indicate the need of immediate care. These "urgent" cases are usually

brought to the attention of the supervising nurse in the retake center. She arranges for the earliest possible appointment at the retake center through telephone calls and/or home visits by health department nurses.

The retake center is centrally located in the city so that it will be convenient to as many people as possible. Although the survey organization usually does not have money to spend to make the center ideal in appearance, the space is carefully arranged. If separate rooms are not available, individual booths are constructed to give each patient privacy during the interview. There are also individual dressing cubicles which open directly into the X-ray room.

Volunteers act as hostesses in the retake center. They greet people who come to be X-rayed, direct them to the clerk-receptionist, introduce them by name to the interviewing nurses, later take them to the X-ray section, explaining how to prepare for the X-ray and assisting them if it is necessary. The clerk-receptionist keeps records, answers the telephone, types the lead-foil X-ray identification strips, checks appointments and rearranges them to suit people's convenience, and types second appointment letters. Because of these arrangements, the public health nurses' time is free for their primary responsibility of interviewing the people who come to be X-rayed.

We have found that the system of giving each person who is recalled to the retake center a definite appointment has several important advantages. It is undoubtedly one reason why so large a proportion of the people recalled for a second film respond. And it saves both time and confusion in the center, since long periods of waiting are avoided and the people are not subject to the discomfort of crowding. For most people, being advised to have a second X-ray is a disturbing experience, and for many, coming to the center is a first experience with "public health." If each interviewing nurse has only four appointments an hour, she can usually manage not to keep people waiting for many minutes, and there will be no crowding in the waiting room. In one survey, as many as 450 appointments were scheduled in a day, and yet there were seldom more than 7 or 8 persons waiting.

In most cities where surveys have been conducted, experienced public health nurses from the health department have been selected for interviewing at the retake center and an exceptionally well-qualified public health nurse has been assigned supervisor of the center. The assignment of nurses from the generalized public health nursing service of the health department to duty in the retake center is desirable for several reasons. Tuberculosis case finding and service to patients are health department functions, and nurses will continue to give care to persons who are found to have tuberculosis. Health department nurses are familiar with the health and welfare agencies

in the city and can make appropriate referrals. There is advantage also to the health department, because many people who have previously known little or nothing about its program become acquainted with one of the services which it has to offer. The nurses add to their skill in interviewing which is useful in the continuing tuberculosis-control program as well as in other programs of the health department. We have recommended that nurses who are loaned or employed temporarily during the survey be assigned to one of the regular programs of the health department, since the duties in the retake center require a thorough knowledge of the health department and other local facilities. In some cities they have taken over the districts of public health nurses who are assigned to the retake center.

The taking of the 14″ x 17″ X-rays and the nursing interview in the retake center are the beginning of the follow-up process, and the impression made upon the person who comes in for these purposes may decide whether he will follow later recommendations. Persons who are recalled may need considerable explanation of the reasons for having a second X-ray and for further diagnostic study if it is required. Most of the people recalled have had no reason to think they might be ill, and their reaction may be either disbelief or great alarm. The content of the interview and the counseling at this point must, of course, be adapted to the individual needs. One of the primary purposes of the interview is to make tentative plans for further diagnostic study if it is needed and to encourage continuation through the total diagnostic process until a definite diagnosis is made. In each interview the nurse (1) explains the reasons for taking the second film; (2) gives information about how and when the report on the 14″ x 17″ films will be received; (3) explains that X-ray interpretation alone does not provide a diagnosis of tuberculosis; and (4) gives assurance of help in planning for care if the need arises.

The other purpose of the nursing interview in the retake center is to obtain certain information to be used in follow-up. On the survey epidemiological form, the nurse records such information as the person's present and past occupation, any history of recent illness, or of tuberculosis or contact with it, and significant information about the person which will help those responsible for subsequent care. For example, it is important for the physician to know that a person has spent some years working in the pottery industry, or that he has had pleurisy with effusion; and the field nurse should know that a patient who is found to have "open" tuberculosis has a baby at home who could be endangered by each additional day of exposure. At this time, the nurse also obtains the name of the physician to whom the report of the 14″ x 17″ X-ray is to be sent, or of the clinic if the person does not have a private physician.

The retake center is under the direct management of a public health nurse from the health department staff. She supervises the nurses and clerical personnel of the center, assigns them to various duties, sees to it that they have proper orientation and complete understanding of the records they use. She has the responsibility for carrying out the personnel policies of the health department, where nurses are concerned, and of the survey for other staff members. She must make sure that epidemiological forms are properly filled out. At the end of each day, she reviews the basic record cards of those who have failed appointments and allocates them for follow-up. She interviews people with special problems and occasionally makes referrals to the survey medical officer, the health department, and other health and social agencies or workers when such is indicated.

We are frequently asked why everyone who comes to have a 14″ x 17″ film is interviewed, since some of these films will be read as negative. Our answer to this is that all the people who come to the retake center are anxious and therefore need help at that point. We also believe that the nursing time used for counseling in the center is a good investment, since fewer home visits are required at a later date to help the patient to understand the need for medical care.

Health Department Nursing and the Survey

The nursing services that are given to survey patients in the health department chest clinic and in their homes by public health nurses are basically the same as those given to tuberculosis patients found in any other way. There is no need, therefore, to discuss them in detail. In the process of consultation with health departments in cities where surveys were to be held, however, we have found that there are certain points which require particular attention in planning for good nursing service for an increased number of patients.

The health department chest clinic, whether it is the existing one expanded to handle a rapidly increasing case load, or a special diagnostic clinic set up in connection with the survey, is an exceedingly important factor in a community-wide chest X-ray survey. The functions of public health nurses in the clinic should be carefully studied before the survey to make sure that nursing time is being used to the maximum benefit of patients. A review of duties often reveals that nurses are doing such work as charting laboratory reports, sending out notifications of appointments, and sorting X-ray films—duties which can be done by trained clerks.

In the clinic, as in the retake center, the scheduling of definite appointments for patients has been found to increase the efficiency of the clinic and to decrease the number of failed appointments. Because many patients found in the survey have had no symptoms of

their illness, the nurse perhaps needs more than the usual amount of time for interviewing them on their first visit.

Methods of referring patients to the chest clinic from the retake center should be carefully worked out to insure prompt attention for the persons who are to have follow-up in the clinic. The steps usually agreed upon by the health department and the survey staff are as follows: The chest clinic provides the survey records department with information on the number of survey-referred cases the clinic can handle on given days. The records department schedules appointments and notifies each patient of what time he is expected at the clinic, telling him that if this time is not satisfactory to him, he can change it by calling the clinic. The list of each day's appointments, with the patient's epidemiological records and 14″ x 17″ films is sent to the chest clinic far enough in advance so that a check can be made against the case register and clinic records. In this way, any information the health department has on a patient can be added to the survey records before he comes to the clinic.

An adequate system of communicating information between the clinic and field nurses, hospitals, and other agencies which give care to patients is also very important to successful follow-up. If the patient is to receive the care and help he needs, the field nurse must know each patient's diagnosis, his sputum status and the results of other laboratory tests, the treatment he has received and is receiving, and recommendations for his care. On the other hand, the clinic staff must be told about home situations, particularly those which make it impossible for the patient to follow the doctor's orders. When a patient is hospitalized, a copy of his complete health department record must be sent to the hospital to provide for continuity in treatment.

As the public health nurse makes home visits during the survey, she has an opportunity to recommend X-rays for the whole family. Sometimes nurses have found that contacts who have previously neglected an examination will have long-overdue X-rays made while the survey is on. Old people who have been clinging to their belief that only young people have tuberculosis may have X-rays in order to enter into the community project.

Although efforts are made in connection with the survey—in the interviews at the retake center and clinic, and by telephone calls and letters—to eliminate the necessity for many home visits, there is no substitute for the public health nurse's visit to teach isolation procedures, to give skilled nursing care to the patient, and to show other members of his family how to care for him. The care of tuberculosis patients and the protection of their families are major public health problems. If there are not enough hospital beds, patients may receive treatment in the home, either following a short stay in the hospital,

or without any hospitalization. Patients for whom bed rest has been recommended need help to understand and accept the restrictions of this important treatment. If home care is to be given to a larger than usual number of patients after a survey, there must be careful scrutiny of the field nursing service to eliminate unproductive activities and to insure full utilization of the staff for care of those patients whose need is greatest.

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Although there have, of course, been variations in the programs of different cities where surveys have been conducted, it has been our experience that there are strong similarities in the problems of providing nursing care and in their solution. In all cities, it has been necessary to analyze carefully the nursing facilities of the area and to plan for efficient use of nursing time. We have been convinced that it is possible to provide for nursing in a survey and not exceed a reasonable budget, and that good individualized service can be given in a screening program with a relatively small nursing staff.

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The Bactericidal Effect of Surface-Active Agents on Tubercle Bacilli

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Because of their potential value, particularly to the field of hygiene, the development of surface-active agents in recent years (*1*) has attracted a great deal of attention. Extensive study has been made of the effects of these agents on bacteria (*2,3*) including some work on their activity against mycobacteria (*4,12*). Reports on the latter reveal that, although some of the surface-active agents are lethal for nonpathogenic acid-fast bacilli, they are effective against virulent tubercle bacilli only at relatively high concentrations or after long periods of exposure. The present study was undertaken to test a representative series of these compounds for disinfectant action against *Mycobacterium tuberculosis*.

Material and Method

Some 400 surface-active compounds, preparations, and mixtures were obtained from manufacturers in all parts of the country. Representative products were then selected for testing on the basis of chemical make-up.

The study was planned as follows: First, a simple test would be run, with no attempt to stop the antibacterial action of the compound by dilution. If near-complete suppression of growth occurred, further tests would be carried out to prove a true killing action. If there were no marked suppression of growth, the compound could not be considered disinfectant at that strength. Actually, it seemed likely that proteins, fats, and lecithin contained in the culture medium would stop the action of anionic and cationic compounds promptly at the moment of planting (*2, 13*).

One-tenth ml. of a suspension containing 0.001 mg. of tubercle bacilli was mixed with 10 ml. of a given dilution of the surface-active agent. The mixture was incubated at 20° C for 10 minutes, and a 0.1 ml. portion of the bacillus-disinfectant mixture was then planted on each of two tubes of culture medium. The number of developing colonies was compared with that in the controls, where the tubercle bacilli were exposed only to distilled water.

The suspension was prepared from a highly virulent human strain isolated in this laboratory and designated as number 88. Weighed

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amounts of moist growth 3- to 4-weeks old (on solid medium) were ground in 0.0125 percent NaOH. Serial dilutions were made after the larger clumps had settled out. The cultures were made on slants of buffered egg-potato-glycerol medium (Loewenstein-Jensen).

Where the product tested was a mixture, dilution was based on the surface-active agent which was presumed to be the active ingredient. Where the proportion of the active ingredient was unknown, dilution was based on the total mixture. The compounds or preparations were tested at dilutions of 1:100 and 1:1000. Those found to be insoluble in these concentrations were tested at saturation or at 1:10,000.

Thirty-eight controlled experiments were run, testing three to five preparations (6 to 10 dilutions) per experiment. In the first half of the series, five separate tests were run for each disinfectant dilution; in the second half, three tests were run. Six separate control tests were run in each experiment.

The results of these experiments, indicating the growth-preventing effect of each of the substances tested in terms of a percentage ($\frac{c-x}{c} \times 100$, where c=the mean number of colonies in the control tubes and x=the mean number in the experimental tubes) are presented in table 1. Statistical analysis indicates only whether the growth-preventing effect is significant. Since the data in table 1 were obtained from many separate experiments, growth-preventing effects for different compounds cannot be compared too closely.

In a second series of nine experiments, there was only one test per disinfectant dilution and two control tests per experiment (table 2). Statistical analysis was not possible.

Dilution Tests.

These were run on compounds giving complete or near-complete suppression of growth in the primary test. With one exception, the test organism was H37R$_v$.[1] One hundred times as much bacterial mass (0.1 mg.) in 0.1 ml. of suspension was mixed with 10 ml. of the disinfectant. After 10 minutes, 0.1 ml. of the mixture was in turn mixed with 10 ml. of water, giving a hundredfold dilution. One-tenth ml. amounts of the primary tubercle bacillus-disinfectant mixture were then seeded on two tubes of culture medium, and like amounts of the secondary dilution mixture were cultured and injected into animals. In the case of Armeen 14 D, tertiary dilution was carried out in the same manner, increasing the primary dilution by 10,000 times. Three to five tests were run for each compound dilution, and five control tests for each experiment.

[1] Kindly provided by William Steenken, Jr., The Trudeau Foundation, Trudeau, N. Y.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*

Surface-active agent (Trade name or designation) [a]	Composition [b]	Dilution of supposed active ingredient [c]	pH	Surface tension in dynes per cm.	Growth-preventing effect in percent [f]
ANIONIC COMPOUNDS					
Nacconol LAL (24)		1:100 [d]	6.2	28.2	58
		1:1000 [d]	6.7	30.4	≤ 0
Hytergen BM (18)	Anionic modified alcohol sulfate	1:100 [d]	8.3	30.2	73
		1:1000 [d]	6.5	30.2	42
Victawet 35B (38)	A phosphorated alcohol	1:100	6.7	28.4	54
		1:1000	6.9	38.9	≤ 12
Victamine D (38)	Octadecylamine salt of esterified octadecylamidophosphoric acid.	1:100 [d]	5.7	29.3	100
		1:1000 [d]	6.8	30.4	79
Aerosol OT (3)	Sodium dioctyl sulfosuccinate	1:100	4.8	28.5	≤ 21
		1:1000	6.5	30.4	≤ 5
Aerosol 18 (3)	Disodium N-octadecylsulfosuccinamate	1:1000	7.8	41.8	≤ 0
		1:10,000			≤ 3
	Sodium xylenesulfonate (43)	1:100 [d]	7.0	50.8	≤ 0
		1:1000	6.5	72.0	≤ 0
	Sodium alkylbenzenesulfonate (43)	1:100	6.8	32.8	≤ 6
		1:1000	6.5	32.7	≤ 0
Ultrawet 30-DS (6)	Sodium alkylbenzenesulfonate	1:100	6.5	32.3	52
		1:1000	6.3	31.0	35
Santomerse D (23)	Sodium decylbenzenesulfonate	1:100	7.0	34.2	≤ 38
			8.0		≤ 16
		1:1000	6.6	33.1	≤ 39
			8.0		≤ 0
Detergent 240 (5)	Sodium nonylnaphthalenesulfonate 40 percent; sodium sulfate 60 percent.	1:100	7.4	31.8	≤ 17
		1:1000	6.8	31.8	≤ 4
Nacconol NR (24)		1:100	6.5	31.4	70
		1:1000	6.6	32.8	≤ 36
Nacconol NRSF (24)		1:100	5.9	33.7	54
		1:1000	6.5	34.4	25
Alroterge (2)	Sodium nonylnaphthalenesulfonate 35 percent; inorganic salts 65 percent.	1:100 [d]	7.0	30.5	82
		1:1000	6.5	30.8	≤ 38
Soft soap, USP	Potassium salts of the fatty acids of cotton seed oil.	1:100 [d]	10.3	31.0	≤ 0
		1:1000 [d]	8.5	35.5	44
Hard soap	Sodium salts of fatty acids	1:100 [e]	10.2	28.6	45
		1:1000 [d]	10.3	30.8	≤ 15
Alrosene 31 (2)	Sodium N-lauroyl-2-aminoethyl sulfate 31 percent; inorganic salts and water 69 percent.	1:100 [d]	8.4	34.4	≤ 21
		1:1000 [d]	7.8	33.6	35
	Potassium N-stearoyl-2-aminoethyl sulfate 24 percent; potassium sulfate 16 percent; water 60 percent (39).	1:100 [d]	8.1	27.8	82
		1:1000 [d]	7.1	29.2	64
	N-(α-Alkylcinnamoyl)-2-aminoethylsulfonic acid (33).	1:100 [e]	2.9	29.4	45
		1:1000 [d]	3.8	33.4	88
	Sodium sulfobutyloleate 60 percent; NaOH amount unknown (5).	1:100	5.7	32.8	≤ 26
		1:1000	5.5	35.4	≤ 0
K Wood Rosin Soap (19).	Sodium salt of abietic acid and its isomers.	1:100	9.0	40.7	≤ 46
		1:1000	7.8	50.7	≤ 36
Vinsol Sodium (19)	Sodium salt of a complex resin containing phenolic hydroxyl and methoxyl groups and a carboxyl group.	1:100	8.3	44.7	≤ 4
		1:1000	7.3	47.4	≤ 17
Staybelite Sodium Soap (19).	Sodium salt of a hydrogenated rosin, mostly of dehydroabietic acid and tetrahydroabietic acid.	1:100	9.3	38.3	≤ 0
		1:1000	8.4	50.3	≤ 0
Sodium Soap of Resin 731–C (19).	Sodium salt of a dehydrogenated rosin which contains 55 percent dehydroabietic acid, dihydroabietic and tetrahydroabietic acids.	1:100	9.5	37.3	≤ 43
		1:1000	8.5	48.3	≤ 40
CATIONIC COMPOUNDS					
Thoral (35)	9-Octadecenyldimethylethylammonium bromide.	1:100	4.2	34.9	≤ 0
			8.1		≤ 0
		1:1000	6.6	35.9	≤ 0
			8.0		≤ 0
LAR 222 (35)	Alkyldimethyl-3,4-dichlorobenzylammonium chloride.	1:1000	7.2	34.9	≤ 25
		1:10,000	7.1	36.8	73
LAR 257 (35)	Alkyldimethylbenzylammonium chloride.	1:100	6.4	38.1	87
		1:1000	7.3	33.6	78
LAR 260 (35)	Cetyltrimethylammonium bromide	1:1000	7.0	37.9	≤ 30
		1:10,000	7.2	50.0	62
	Phenyl dimethylaminoethyl ketone methosulfate (21).	1:100			100
		1:1000			≤ 27
Zephiran (41)	Alkyldimethylbenzylammonium chloride.	1:100	7.1	36.8	49
		1:1000	7.0	34.8	46

See footnotes at end of table.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*—Continued

Surface-active agent (Trade name or designation) [a]	Composition [b]	Dilution of supposed active ingredient [c]	pH	Surface tension in dynes per cm.	Growth-preventing effect in percent [f]
		CATIONIC COMPOUNDS—Continued			
Cationic UC-50 (6)		1:100	6.9	33.0	77
		1:1000	6.7	30.8	64
Deceresol SE (3)	Stearamidopropyldimethyl-2-hydroxyethylammonium chloride.	1:100	6.5	40.4	62
		1:1000	6.5	40.2	44
	Carbostearyloxymethylpyridinium bromide (33).	1:100	2.4	28.0	94
			8.2		60
		1:1000	3.4	30.4	60
			8.1		16
Emulsept E607 (13)	N-(Acylcolaminoformylmethyl)-pyridinium chloride.	1:100 [d]	3.7	31.7	34
		1:1000	4.4	31.4	19
	Tetradecyl bromide quaternary salt of nicotinamide (36).	sat. sol	6.7	38.2	23
		1:10,000	6.5	42.5	12
	N-tetradecyl-γ-picolinium chloride (36).	1:100	5.3	43.0	ε 36
			8.0		ε 9
		1:1000	6.4	44.0	ε 22
			8.2		ε 0
	Cetyl chloride quaternary salt of niketh-amide (36).	1:100	3.7	41.6	59
			8.2		ε 0
		1:1000	5.1	43.8	35
			8.2		ε 0
	4-Tridecyl-*n*-allylpyridinium bromide (36.)	1:100	6.7	35.8	ε 33
		1:1000	6.1	39.3	ε 11
	Benzyl chloride quaternary salt of dodecylisonicotinamide (36).	sat. sol	6.7	40.8	ε 35
		1:10,000	6.6	49.0	ε 29
A-509-R (12)		1:100	7.3	35.9	83
			7.4	35.7	68
		1:1000	6.9	36.6	60
			6.9	36.4	59
	(1-Phenyldodecyl)-dimethylcinnamylammonium chloride (32).	1:100	6.5	39.2	86
		1:1000	6.5	41.5	ε 0
		1:10,000	6.6	49.9	ε 8
	(*p*-tert-Octylphenoxyethoxyethyl)-trimethylammonium chloride (28).	1:100	4.2	38.1	43
		1:1000	6.6	48.8	ε 18
	(2,2,4,4,-Tetramethylbutylphenoxyethoxyethyl)-dimethyl benzylammonium chloride 5%; sodium tripolyphosphate and modified soda, amounts unknown (43).	sat. sol	9.0	34.6	96
		1:1000	9.6	37.6	65
Teramine (40)	(*p*-tert-Octylphenoxyethoxyethyl)-dimethylbenzylammonium chloride.	1:100	2.9	32.6	80
		1:1000	3.3	32.4	30
	2-Benzhydryloxyethyldimethyl-(carbo-2-ethylhexyloxymethyl)-ammonium chloride (28).	1:100	5.1	35.8	87
			8.0		64
		1:1000	5.3	35.0	ε 26
			8.1		ε 0
Timsen (31)	(Diisobutylphenoxyethoxyethyl)-dimethylbenzylammonium chloride 95 percent; NaCl 5 percent.	1:100	6.5	35.7	67
		1:1000	6.5	33.2	ε 32
	(*p*-Diisobutylphenoxyethoxyethyl)-dimethylbenzylammonium chloride (20).	1:100	7.8	33.4	69
		1:1000	7.8	32.8	45
Dichloran (15)	Lauryldimethyl-3, 4-dichlorobenzylammonium chloride.	1:100	7.0	32.5	91
		1:1000	6.5	32.5	51
Cetol (15)	Cetyldimethylbenzylammonium chloride.	1:100	5.4	38.7	77
		1:1000	6.1	39.7	37
Catylon D (18)	Stearic acid complex amine condensate.	1:100 [d]	5.9	36.0	72
		1:1000 [d]	5.2	39.7	54
LAR 265 (35)	A quaternary ammonium pentachlorophenate.	1:100 [d]	6.5	38.2	91
		1:1000 [d]	6.9	43.1	54
Hyamine 3258 (30)	Trimethyloctadecylammonium pentachlorophenate 87.5 percent; trimethyloctadecylammonium chloride 10.5 percent; NaCl 2 percent.	1:100 [d]			100
		1:1000 [d]			95
		1:10,000 [d]			67
	Ceepryn sulfathiazole (37)	1:100 [d]	7.4	48.3	100
		1:1000 [d]	7.4	48.5	46
		sat. sol			ε 0
	Cetamium sulfathiazole (37)	1:100 [d]	7.1	36.7	100
		1:1000 [d]	7.2	41.3	43
		sat. sol			32
	Ceepryn sulfapyridine (37)	1:100	8.5	39.9	63
		1:1000	8.0	41.6	52
	Diethylhexadecyl-2-hydroxyethylammonium chloride (21).	1:100	6.8	39.5	39
		1:1000	7.3	39.8	ε 39
	β-Dibenzylaminoethanol methiodide (21)	sat. sol	7.4	62.5	53
		1:1000	7.3	64.3	ε 41
	Benzyldiethyl-2-(heptadecylcarbamyloxy)-ethylammonium bromide (33).	1:100	5.6	29.5	96
		1:1000	7.8	29.5	56

See footnotes at end of table.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*—Continued

Surface-active agent (Trade name or designation) [a]	Composition [b]	Dilution of supposed active ingredient [c]	pH	Surface tension in dynes per cm.	Growth-preventing effect in percent [f]
		CATIONIC COMPOUNDS—Continued			
Hyamine 3258 (30)—Continued.	1-Octyl-8-hydroxyquinolinium bromide (21).	1:100	6.2	33.7	21
		1:1000	7.2	59.0	37
	Dimethyl-2-(2-hydroxyethoxy)-ethyloctadecylammonium chloride (21).	1:1000 [d]	4.2	38.6	100
			8.2		98
		1:100 [d]	6.0	37.3	78
			8.1		84
Ctab (8)	Cetyltrimethylammonium bromide	sat. sol	5.9	35.9	57
		1:1000	6.3	38.9	≤ 11
	Cetyldiethyl-(2-hydroxyethyl)-ammonium chloride (27).	1:100	5.3	37.3	54
		1:1000	6.3	40.8	≤ 14
260 (27)	Cetyl-di-*n*-propyl-(2-hydroxyethyl)-ammonium chloride.	1:100	5.1	41.4	67
		1:1000	6.2	42.2	≤ 21
	Benzyldiethyl-2-(heptadecylcarbamyloxy)-ethylammonium chloride (33).	1:100 [d]	3.7	29.7	100
			8.0		43
		1:1000 [d]	4.4	30.2	72
			8.2		≤ 0
	N-(α-Hexylcinnamoyl)-2-aminoethyltriethylammonium bromide (33).	1:100	6.7	39.2	42
		1:1000	6.4	44.2	37
	N-(α-Decylcinnamoyl)-2-aminoethyltriethylammonium bromide (33).	1:100	4.7	34.7	62
		1:1000	6.1	37.2	≤ 11
	Tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride (21).	1:100 [e]	3.1	34.8	99.9
			8.0		99.3
		1:1000 [d]	3.6	39.8	65
			8.1		≤ 28
	2-(α-decylcinnamoxy)-ethyltriethylammonium bromide (33).	1:100 [d]	4.4	31.6	70
		1:1000	4.2	33.0	≤ 7
	2-(α-decylcinnamoxy)-propyltriethylammonium bromide (33).	1:100	3.7	32.2	75
			8.0		42
		1:1000	4.2	33.2	≤ 13
			8.6		≤ 12
	Dodecylpyridinium chloride (33)	1:100	4.2	41.0	34
			8.5		≤0
		1:1000	5.2	40.6	6
			8.1		≤ 0
	Hexadecyl-2-thenylammonium chloride (21).	sat. sol	7.2	42.7	≤ 0
			8.4		≤22
		1/10 sat	6.3	42.3	≤8
			8.0		≤22
Arquad 2HT (4)	Dimethyl "ditallow" ammonium chloride 68 percent; isopropanol 29 percent; salt 2 percent; secondary amine hydrochloride 1 percent.	1:148	6.5	37.2	≤0
		1:1480		32.8	≤25
Arquad 2C (4)	Dimethyl "dicoco" ammonium chloride 60 percent; secondary amine hydrochloride 3.5 percent; NaCl 4.5 percent.	1:166	4.9	30.7	74
		1:1660		30.5	≤26
Hyamine 1622 (30)		1:100	6.7	35.5	45
			8.1		22
		1:1000	6.9	38.0	50
			8.1		≤13
	N-Laurylbenzotriazole ethobromide (36)	1:100			76
		1:1000			67
Intracol caprylic (34)	A caprylic acid amide with multiple amino groups.	sat. sol	10.5	28.4	75
		1:1000	9.5	35.3	72
Armeen 14D (4)	Tetradecylamine 90 percent; dodecylamine 4 percent; hexadecylamine 4 percent; octadecenylamine 2 percent.	1:100 [d]	10.3	37.6	100
		1:1000 [d]	9.9	31.8	99.9
Amine 0 (2)	1-Hydroxyethyl-2-heptadecenylimidazoline.	1:100 [d]	9.5	30.4	59
		1:1000 [d]	7.5	31.4	47
Quaternary 0 (2)	1-Hydroxycthyl-2-heptadecenylimidazolinium chloride.	1:100	6.0	31.8	75
		1:1000	5.9	38.2	44
Armeen 18D (4)	Octadecylamine 93 percent; hexadecylamine 6 percent; octadecenylamine 1 percent.	1:1000	8.7		92
		1:10,000	7.0		≤ 51
	Tetraethylene pentamine (9)	1:100	4.0	42.6	41
			11.1		57
		1:1000	4.0	52.0	≤ 24
			10.7		≤ 12
Nopcogen 20–0 (25)	Aminoethylamide of oleic acid	1:100	10.3	31.2	61
		1:1000	9.4	33.0	≤ 0
Nopcogen 14–L (25)	Diethanolamide of lauric acid	1:100	9.4	30.2	94
		1:1000	9.1	30.7	37
Nopcogen 11–0 (25)	Monoethanolamide of oleic acid	sat. sol	4.1		16
		1:1000			13

See footnotes at end of table.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*—Continued

Surface-active agent (Trade name or designation) [z]	Composition [b]	Dilution of supposed active ingredient [v]	pH	Surface tension in dynes per cm.	Growth-preventing effect in percent [f]
NONIONIC COMPOUNDS					
Tween 40 (7)	Sorbitan monopalmitate polyoxyalkylene derivative.	1:100 [d]	6.3	43.1	[g] 0
		1:1000 [d]	6.9	44.2	[g] 0
Hymotol 307 (18)	Fatty acid polyglycol condensate	1:100	5.1	33.9	70
		1:1000	6.4	36.1	46
Nonisol 310 (2)	Distearate of nonaethylene glycol	1:100 [d]	6.6	39.2	63
		1:1000	6.4	37.8	39
Hymolon K (18)	"Non-ionic liquid amine fatty acid condensate"	1:100 [d]	9.7	30.2	80
		1:1000 [d]	9.2	30.3	50
Nonionic NPE-10 (6)	Nonylphenoxydecaethylene glycol	1:100	6.8	32.4	62
		1:1000	6.4	33.4	41
Triton X-100 (30)	Alkylarylpolyether alcohol	1:10			96
		1:100		33.3	85
		1:1000			25

[a] Number in parenthesis is key to source or name of supplier:

(1) Alox Corporation.
(2) Alrose Chemical Company.
(3) American Cyanamid Company.
(4) Armour and Company.
(5) Arnold, Hoffman & Company, Incorporated.
(6) The Atlantic Refining Company.
(7) Atlas Powder Company.
(8) J. T. Baker Chemical Company.
(9) Carbide and Carbon Chemicals Corporation.
(10) Commercial Solvents Corporation.
(11) E. I. du Pont de Nemours & Company.
(12) Emery Industries, Incorporated.
(13) The Emulsol Corporation.
(14) Falls Chemical Products Company.
(15) Fine Organics, Incorporated.
(16) General Dyestuff Corporation.
(17) Givaudan-Delawanna, Incorporated.
(18) The Hart Products Corporation.
(19) Hercules Powder Company.
(20) Hunt Manufacturing Company.
(21) The Lilly Research Laboratories.
(22) The William S. Merrell Company.
(23) Monsanto Chemical Company.
(24) National Aniline Division, Allied Chemical & Dye Corporation.
(25) Nopco Chemical Company.
(26) Onyx Oil & Chemical Company.
(27) Ortho Research Foundation.
(28) Parke, Davis & Company.
(29) Procter & Gamble.
(30) Rohm & Haas Company.
(31) Theo Ross Associates.
(32) Sharpe & Dohme, Incorporated.
(33) Division of Medicinal Chemistry, The Squibb Institute for Medical Research
(34) Synthetic Chemicals, Incorporated.
(35) Turco Products, Incorporated.
(36) The Upjohn Company.
(37) Vick Chemical Company.
(38) Victor Chemical Works.
(39) Warwick Chemical Company.
(40) West Disinfecting Company.
(41) Winthrop-Stearns, Incorporated.
(42) Jacques Wolfe & Company.
(43) Wyandotte Chemicals Corporation.

[b] As reported by supplier. The supposed active ingredient is listed first.
[c] Where the proportions of the ingredients are unknown, dilution is based on the total mixture.
[d] Fine suspension, or solution not clear.
[e] Gelatinous.

[f] $\frac{c-x}{c} \times 100$, where c=mean number of colonies in the control, and x=mean number in the experimental tubes. Killing effects cannot be compared too closely since they were determined from many separate experiments, and since there is considerable possible variation in these figures.
[g] Not statistically significant.

Guinea Pig Inoculation.

In addition to culture, animal inoculation was used as a test of viability and virulence in a few cases. Injection was done subcutaneously and the animals autopsied 2 months after inoculation. $H37R_v$ was used as the test organism.

Results

One hundred and forty-two representative surface-active preparations were investigated, 90 by multiple tests (table 1) and 52 by single tests (table 2). Of the compounds tested, 44 were anionic, 91 cationic, and 7 nonionic. While many of these preparations showed significant growth-preventing action, especially in 1:100 dilution, few were sufficiently potent to warrant further investigation.

Table 2. *Growth-preventing effect of surface-active agents (one test per dilution)*

Chemical type of supposed active ingredient	Surface-active agent (trade name or designation)[a]	Growth-preventing effect[b] Dilution[c] 1 : 100	1 : 1000
ANIONIC COMPOUNDS			
Salts of alkyl sulfonates	Mixture (43 [d])	+	+
	Sodium alkylsulfonate (11)	+	+
Salts of alcohol sulfates	Dreft (29)	++	+
Salts of phosphoric acid esters	Victawet 12 (38)	++	+
	Victawet 1160 (38)	++	+
	Victawet 58 B (38)	+	+
Salts of alkyl aryl sulfonates	Mixture (43)	+	+
	Mixture (43)	+	+
	Sodium alkylarylsulfonate (16)	+	+
	Sodium isobutylnaphthalenesulfonate (16)	+	+
	Facid (13)	+	+
	Tensol 5Z (34)	++	+
Salts of fatty acid amide sulfonates or sulfates.	Mixture (16) [d]	+	+
	Oratol L-48 #3412 (42)	+	+
Salts of fatty acid ester sulfonates	Mixture (16) [d]	+	+
Oxygenated hydrocarbons	Alox 100 (1) (sat. sol.)	------	+
	Alox 600 (1) (sat. sol.)	------	+
	Alox 828 (1) (sat. sol.)	------	++++
	Alox 125 (1) (sat. sol.)	------	++
CATIONIC COMPOUNDS			
Quaternary amine, salts	Alkyldimethylbenzylammonium chloride (16)	+	+
	RO-A (41)	+	+
	Benzylphenyldimethylammonium chloride (21)	+	+
	β-Dibenzylaminoethanol methiodide (21)	+	+
	Ceepryn (22)	+	+
	Tetradecylpyridinium chloride (36)	+	+
	MPO-1045, product BC (11)	+	+
	Carbotetradecyloxymethylpyridinium bromide (7)	+	+
	Mixture (16)	+	+
	(*p*-tert-Octylphenoxyethoxyethyl)-morpholine hydrochloride (28).	+	+
	Ethyl-*n*-hexadecyl-2-ketomorpholinium bromide (28).	+	+
	(β-benzhydryloxyethyl)-dimethyl-*n*-octylammonium bromide (28).	++	+
	(β-benzhydryloxyethyl)-dimethyl-*n*-nonylammonium bromide (28).	++	+
	(β-benzhydryloxyethyl)-dimethyl-*n*-decylammonium bromide (30).	++	+
	RO-C (41)	++	+
	Hydrofect (40)	++	+
	(*p*-tert-Octylphenoxyethyl)-dimethylcinnamylammonium chloride (28).	++	+
	Trimethyl-(3-dodecyloxymethyl-4-methylphenyl)-ammonium methyl sulfate (17).	++	+
	LAR 262 (35) (fine susp.)	++	+
	Carbotetradecyloxymethylpyridinium chloride (33)	++	+
	Ethyl bromide quaternary salt of N-tetradecylbenztriazole (36).	++	+
	Tetrosan 60 percent (26)	+++	+
	(1-Benzyldodecyl)-benzyldimethylammonium chloride (32).	+++	+
Alkanol amines or their fatty acid esters.	Intracol O (34)	+	+
	Intracol R (34)	+	+
	Intracol caproic (34)	+	+
Thiouronium salts	Triglycoldithiouronium dihydrochloride (28)	+	+
	Benzhydrylisothiourea hydrobromide (fine susp. at 1 : 100) (28).	+	+
	p-tert-Octylphenoxyethoxyethylisothiourea hydrochloride (fine susp. at 1 : 100) (28).	+	+
	Octylthiouronium chloride (28)	++	+
	p-Nitrobenzylisothiourea hydrochloride (28)	+++	+
NONIONIC COMPOUNDS			
Fatty acid esters	G-1226 (7)	+	+
Polyether alcohols	Triton X-30 (30)	+	+

[a] Numbers in parentheses refer to name of supplier (see table 1 footnote [a]). [b] +=slight or none (0 to 50 percent growth prevention). ++=partial (51 to 89 percent growth prevention). +++=marked (90 to 99 percent growth prevention). ++++=complete (100 percent growth prevention). [c] In mixtures, dilutions are based on supposed active ingredients. [d] Dilution based on total mixture, since proportion of active ingredient was unknown.

Only 10 preparations, 2 of them anionic and the rest cationic, caused complete or near-complete growth prevention at dilutions of 1:100 or higher: Victamine D, Hyamine 3258, Ceepryn sulfathiazole, Cetamium sulfathiazole, dimethyl-2-(2-hydroxyethoxy)-ethyloctadecylammonium chloride, benzyldiethyl-2-(heptadecylcarbamyloxy)-ethylammonium chloride, tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride, Armeen 14D, phenyl dimethylaminoethyl ketone methosulfate, and Alox 828. Solutions of the first eight of these were not clear. Most of them, however, were very fine dispersions that required several days to separate; some were also gelatinous. Ceepryn sulfathiazole and Cetamium sulfathiazole, which at dilutions of 1:100 were fine suspensions that quickly settled out, showed relatively little suppressive action when in saturated solution. Of the remaining eight preparations, seven were re-examined by means of the *dilution* test, the results of which are shown in table 3. To reduce turbidity, Victamine D, Hyamine 3258, tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride, and dimethyl-2-(2-hydroxyethoxy)-ethyloctadecylammonium chloride were tested at primary dilutions of 1: 200. Armeen 14D was brought into clear solution by means of isopropyl alcohol, 9 parts, and Triton X-100, 10 parts. The growth-preventing effect after secondary dilution drops markedly for all but Alox 828 and Armeen 14D. Animal inoculation substantiates the cultural findings.

One of the two most active preparations, Alox 828, caused complete prevention of growth in saturated solution, a dilution greater than 1:1000. This preparation, a highly insoluble, oily liquid, is reported by the manufacturer to be "the oxidation product of low molecular weight hydrocarbons," and we have classified it as anionic although its exact composition is unfortunately not known. Its high antitubercle bacillus activity was twice substantiated by guinea pig inoculation, and its effectiveness was not diminished by secondary dilution.

When Alox 828 was brought into solution with 9 parts of isopropyl alcohol and 8 parts of Triton X-100, however, its activity was greatly reduced. Thus, at a dilution of 1:1000, it had no significant effect, and at 1:100 there was not quite complete- (99 percent) growth prevention.

The other apparently potent preparation, Armeen 14D (principally tetradecylamine), a white, waxy substance that is cationic in nature, caused complete-growth prevention at a dilution of 1:100 and almost complete at 1:1000. Solutions in water are not clear. When brought into clear solution with 9 parts of isopropyl alcohol and 10 parts of Triton X-100, complete-growth suppression was obtained at a dilution of 1:1000. Its activity was not diminished by secondary and even

Table 3. *Dilution tests (Alteration of growth-preventing effect by secondary dilution)*

Surface-active agent (trade name or designation) [a]	Primary 10-minute exposure		Seconday dilution		
	Dilution of preparation [b]	Growth-preventing effect in percent	Dilution of preparation	Growth-preventing effect in percent	Guinea pig inoculation
Alox 828 (1)	Sat. sol.>	[d] 100	>1:100,000	100	
	1:1000	0	1:1,000,000	0	
	1:10,000				
Victamine D (38)	1:200 [b]	99.2	1:20,000	14	Positive.
Hyamine 3258 (30)	1:200 [b]	99.97	1:20,000	72	Do.
Tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride (21).	1:200 [b] [c]	99.5	1:20,000	40	Do.
Phenyldimethylaminoethylketone methosulfate (21).	1:100	99	1:10,000	27	Do.
Dimethyl-2-(2-hydroxyethoxy-ethyl-octadecylammonium chloride (21).	1:200 [b]	99.98	1:20,000	67	Do.
Armeen 14D (4) in 9 parts of isopropyl alcohol and 10 parts of Triton X-100 (30).	1:100	100	1:10,000	• 100	Negative (tertiary dilution).
	1:1000	100	1:100,000	• 100	Do.

[a] Numbers in parentheses are key to name of supplier (see table 1 footnote [a]).
[b] Fine suspension or solution not clear.
[c] Gelatinous.
[d] Guinea pig inoculation negative.
• Tertiary dilution to 1:1,000,000 and 1:10,000,000 did not alter the 100 percent growth-preventing effect as evidenced by negative culture and guinea pig inoculation.

tertiary dilution to 1:10,000,000 as tested by both culture and animal inoculation (table 3).

A related preparation, Armeen 18D (principally octadecylamine) that caused 92 percent growth prevention at a dilution of 1:1000 was not investigated further.

The effect of raising the pH of the solution (to about 8) was tested in 14 preparations, 13 of which were cationic (table 1). There was either a diminution of activity against the tubercle bacillus (10 preparations) or no significant change (4 preparations). There was never an increase in activity.

While there seems to be a general tendency for the activity of the preparations to increase as the surface tension diminishes, this is by no means uniform. Whereas some of the less effective preparations have relatively low surface tension (e. g., Aerosol O. T.), one of the most active compounds, tetradecylamine, has the relatively high surface tension of 37.6 dynes per cm. at a dilution of 1:100.

There is little that can be said about the effect of chemical structure. In general, the anionic compounds are somewhat less active than the cationic, although the variation is great.

The following compounds were also tested by animal inoculation and found to be inadequate disinfectants at dilutions of 1:100: Zephiran, carbostearyloxymethylpyridinium bromide, Ctab, cetyl-di-*n*-propyl (2-hydroxyethyl)-ammonium chloride, and Aerosol 18. The usual 10-minute test was performed and the animals in each case developed tuberculosis.

Discussion

The growth-preventing effects of surface-active agents (tables 1 and 2) may represent the results of an immediate kill taking place in the 10-minute exposure period, or an action persisting after culture. Any persistent action may be bactericidal or bacteriostatic. That the culture medium does not always inactivate the reagent is indicated by the secondary dilution procedure which sometimes resulted in an appreciably diminished growth-preventing effect.

It will be noted (tables 1 and 2) that there are a few inconsistencies. For example, a higher growth-preventing effect is occasionally indicated for the higher dilution, but the differences are not statistically significant in most instances.

Moreover, the antibacterial action of a compound will not necessarily be predictable and uniform where true solutions are not obtained. Solid material that may be irregularly present in samples may interfere with disinfectant action or cause persistent action after culture. This may serve to explain inconsistencies noted with soft soap, Alrosene 31, and N-(α-alkylcinnamoyl)-2-aminoethylsulfonic acid, where the solutions were not clear. It does not, however, explain those found with LAR 222, cetyltrimethylammonium bromide and 1-octyl-8-hydroxyquinolinium bromide.

Most of the results, however, are consistent in demonstrating that the growth-preventing effects of these surface-active agents are relatively low for tubercle bacilli. High bactericidal activity, sufficient for practical disinfection, is missing, except in rate instances. While longer periods of exposure might in some cases result in complete killing, it seems unlikely that this would be true in sufficiently high dilution to provide economically practical disinfection.

Among the compounds tested are many that appear to be extraordinarily active against pathogens other than tubercle bacilli, especially the quaternary amine salts (*3*). Despite the fact that many of these agents are now widely recommended and used in disinfection and sanitation (*14*, *15*, *16*), they cannot be counted upon to kill tubercle bacilli. The lack of satisfactory disinfectant action by such well-known preparations as Emulsept, Ceepryn, Phemerol, soap, Dreft and alkyldimethylbenzylammonium chlorides (of which 3 different brands were tested), is especially disappointing. In the case of Armeen 14D, study has not yet been sufficient to show whether it can be recommended for practical disinfection.

Although the reasons for the relative ineffectivness of surface-active agents against tubercle bacilli are obscure, there is evidence that the phospholipids interfere with the anti-bacterial action of anionic and cationic compounds (*17*). Since the tubercle bacillus is rich in these substances, it may be naturally protected against the surface-active agents.

Summary

1. One hundred and forty-two representative surface-active agents, including the anionic, cationic, and nonionic groups, were tested for bactericidal action against tubercle bacilli.

2. One preparation, Armeen 14D, showed sufficient activity to be considered for practical disinfection. Its precise usefulness, however, awaits further study.

3. As a group, the surface-active agents are not good disinfectants against the tubercle bacillus. This applies even to the quaternary ammonium salts, which are now in widespread use in disinfection and sanitation.

Addendum

The authors wish to note some observations on two points which are related to the subject matter of this study: The effects of some common disinfectants on the tubercle bacillus, and the effects of some of the compounds examined in this study on pathogens other than tubercle bacilli.

Common Disinfectants and the Tubercle Bacillus

In the course of this study, the authors tested a series of phenolic compounds, using the same techniques. Compound cresol solution (USP) gave 100-percent suppression of growth at a dilution of 1:100, and only 28 percent at a dilution of 1:200. Amphyl (containing p. tert. amylphenol) maintained the complete growth-supressing effect it had at 1:100 even after extensive further dilution. A series of pine oils and their fractions were quite potent.

Previously, ethyl and isopropyl alcohols in several strengths were found to be highly disinfectant (*18*).

Formaldehyde, mercury oxycyanide, metaphen, and mercury bichloride were also tested by this method: mercury bichloride proved to be highly potent, giving complete killing at a dilution of 1:1000, while formaldehyde was completely effective at 4 percent. Mercury oxycyanide, 1:1000, failed to suppress growth after a contact period of 6 hours, and metaphen, 1:500, failed in 2 hours.

In addition, the authors have exposed positive sputum films (dried) to several of these surface-active agents for a period of 10 minutes, using the same technique as in the alcohol study (*18*). Complete suppression of growth was not obtained in the case of 2 brands of alkyldimethylbenzylammonium chloride, Hyamine 1622, Urolocide, and Ceopryn (all well-known quaternary ammonium compounds).

The prolonged action of dried films of surface-active agents on tubercle bacilli was also tested. Cover slips were dipped in 1 percent solutions and allowed to dry, after which a loopful of tubercle bacillus suspension was deposited on the surface and recovery made after 24

hours' exposure. There was only partial suppression of growth by several quaternary ammonium compounds.

Surface-Active Agents and Other Pathogens

Alkyldimethylbenzylammonium chloride (Zephiran, Winthrop-Stearns, Inc.), cetyltrimethylammonium bromide (Ctab, J. T. Baker Chemical Co.), and (*p*-diisobutylphenoxyethoxyethyl) dimethylbenzylammonium chloride (Hyamine 1622, Rohm & Haas Co.) were tested in dilutions of 1: 1000 and 1: 10,000 against *Staphylococcus aureus* and *Escherichia coli*, using the same technique as that employed against tubercle bacilli. The suspensions were prepared from fresh cultures growing on nutrient agar. Three separate tests using two culture tubes each were carried out for each microorganism and for each dilution of the several antiseptics. The test culture medium was the same Loewenstein's buffered egg-potato-glyceral medium used for the culture of tubercle bacilli, except that malachite green was omitted. There was complete suppression of growth by all three compounds at both dilutions, while the control tubes showed abundant growths.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports From States for Week Ended November 11, 1950

Whooping Cough

Although the week ended November 11 is near the seasonal low week for whooping cough, more new cases of this disease were reported than any other of the common diseases of childhood. A total of 1,780 cases was reported as compared with 1,504 for the same week in 1949, and the 5-year median was 1,863 cases. The cumulative total since the seasonal low week, which falls between September 27 and October 3, is 9,374 as compared with 8,657 for 1949. The cumulative total for the "disease" year 1949–50 which ended September 30 was 118,731 which is more than double the total for the previous year

Comparative Data for Cases of Specified Reportable Diseases: United States

Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Nov. 11, 1950	Nov. 12, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)			(1)	(1)	(1)	(1)	(1)	40	45	(1)
Diphtheria (055)	126	241	344	27th	2,003	2,916	3,856	5,131	6,684	10,153
Acute infectious encephalitis (082)	16	9	12	(1)	(1)	(1)	(1)	857	687	574
Influenza (480–483)	1,900	1,658	1,834	30th	18,214	14,121	14,916	264,473	89,988	158,091
Measles (085)	1,661	777	1,544	35th	[2] 8,811	6,054	8,562	[2] 296,982	594,572	565,154
Meningococcal meningitis (057.0)	74	50	58	37th	482	451	451	3,281	2,967	3,021
Pneumonia (490–493)	1,037	1,001		(1)	(1)	(1)	(1)	70,958	67,115	
Acute poliomyelitis (080)	902	749	490	11th	28,685	38,857	22,964	29,816	39,770	23,431
Rocky Mountain spotted fever (104)	1	2	3	(1)	(1)	(1)	(1)	446	553	541
Scarlet fever (050)	996	1,003	1,405	32d	7,203	7,571	9,912	47,373	65,237	71,388
Smallpox (084)		1	1	35th	3	4	6	29	45	153
Tularemia (059)	6	8	8	(1)	(1)	(1)	(1)	784	979	831
Typhoid and paratyphoid fever (040, 041) [3]	50	45	69	11th	[4] 2,591	3,041	3,041	[4] 3,100	3,529	3,529
Whooping cough (056)	1,780	1,504	1,863	39th	9,374	8,657	9,788	106,569	55,259	85,663

[1] Not computed.
[2] Addition: Wisconsin, week ended November 4, 30 cases.
[3] Including cases reported as salmonellosis.
[4] Deduction: Maine, week ended September 23, 1 case.

when 56,635 cases were reported. Estimated mortality rates based on a 10-percent sample of deaths for the first 8 months of 1950 was 0.8 per 100,000 population which was 60 percent higher than that for a similar period in 1949.

Other Diseases

The number of cases of poliomyelitis for the current week was 902, which was 17 percent lower than for the previous week. The total since the seasonal low week is 28,685 as compared with 38,857 for last year. Seventy-four cases of meningococcal meningitis were reported, as compared with 50 for the same week in 1949, and 58 for the 5-year median. There were no cases of smallpox reported.

Report of Outbreak of Encephalitis

It has been reported to the Communicable Disease Center in Atlanta that an encephalitis-like disease of horses occurred recently in Harrison and Hancock Counties, Miss., starting on September 26, 1950, and ending about October 20. At least 21 cases in horses are known to have occurred.

Confirmation of type of disease by laboratory examination could not be obtained. Investigators were of the opinion that the disease was Eastern Equine Encephalitis, despite the unusually late appearance of the disease. Mosquitoes were very abundant and the weather was extremely warm at the time of the outbreak.

At about the same period, several human cases with encephalitis-like symptoms were noted by local physicians, but the exact cause of the illness in man was not established.

Deaths During Week Ended November 11, 1950

Data for 93 large cities of the United States:	Week ended Nov. 11, 1950	Corresponding week, 1949
Total deaths	8, 766	8, 449
Median for 3 prior years	8, 536	----------
Total deaths, first 45 weeks of year	410, 484	410, 036
Deaths under 1 year of age	685	616
Median for 3 prior years	619	----------
Deaths under 1 year of age, first 45 weeks of year	27, 817	29, 152
Data from industrial insurance companies:		
Policies in force	69, 639, 517	70, 056, 330
Number of death claims	11, 391	7, 798
Death claims per 1,000 policies in force, annual rate	8. 5	5. 8
Death claims per 1,000 policies, first 45 weeks of year, annual rate	9. 2	9. 1

Reported Cases of Selected Communicable Diseases: United States, Week Ended Nov. 11, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**126**	**16**	**1,900**	**1,661**	**74**	**1,037**	**902**
New England	**1**		**3**	**45**	**1**	**44**	**33**
Maine						9	2
New Hampshire			2				2
Vermont				1			
Massachusetts	1			36	1		12
Rhode Island				5			1
Connecticut			1	3		35	16
Middle Atlantic	**5**	**1**	**7**	**475**	**17**	**284**	**184**
New York	5	1	[1] 4	163	7	193	107
New Jersey			3	77	1	40	29
Pennsylvania				235	9	51	48
East North Central	**10**	**4**	**20**	**397**	**20**	**115**	**254**
Ohio	4		1	94	3		65
Indiana	3	1	18	5	2	25	31
Illinois	1		1	75	7	39	50
Michigan	1	3		45	7	35	64
Wisconsin	1			178	1	16	44
West North Central	**7**	**1**		**123**	**5**	**73**	**82**
Minnesota	4			6	2	4	13
Iowa				5		2	21
Missouri	3			81	2	9	14
North Dakota				21		40	1
South Dakota				1			4
Nebraska				2			11
Kansas		1		7	1	18	18
South Atlantic	**39**		**367**	**100**	**9**	**109**	**112**
Delaware							1
Maryland				1		17	7
District of Columbia				2		16	5
Virginia	2		304	42	3	43	28
West Virginia	4		44	24		5	9
North Carolina	16			14	3		14
South Carolina	5		13	8	1	5	5
Georgia	12		6	6		8	32
Florida				3	2	15	11
East South Central	**31**	**1**	**23**	**44**	**9**	**41**	**39**
Kentucky	9			25	1	13	6
Tennessee	8	1	16	12	5		13
Alabama	13		5	3	1	14	3
Mississippi	1		2	4	2	14	17
West South Central	**27**		**1,344**	**95**	**7**	**282**	**64**
Arkansas	2		85	10		22	4
Louisiana	1		2	2	1	26	10
Oklahoma	2		35	7	1	25	9
Texas	22		1,222	76	5	209	41
Mountain	**5**		**128**	**117**	**2**	**44**	**21**
Montana	1		15	7			3
Idaho			18	5		10	4
Wyoming	1			3			
Colorado	1		21	77	1	16	6
New Mexico				13		4	3
Arizona	2		72	4	1	13	5
Utah			2	8		1	
Nevada							
Pacific	**1**	**9**	**8**	**265**	**4**	**45**	**113**
Washington			1	82		1	23
Oregon			4	13	2	8	28
California	1	9	3	170	2	36	62
Alaska							2
Hawaii			32	3			

[1] New York City only.

913934—50——3

Reported Cases of Selected Communicable Diseases: United States, Week Ended Nov. 11, 1950—Continued

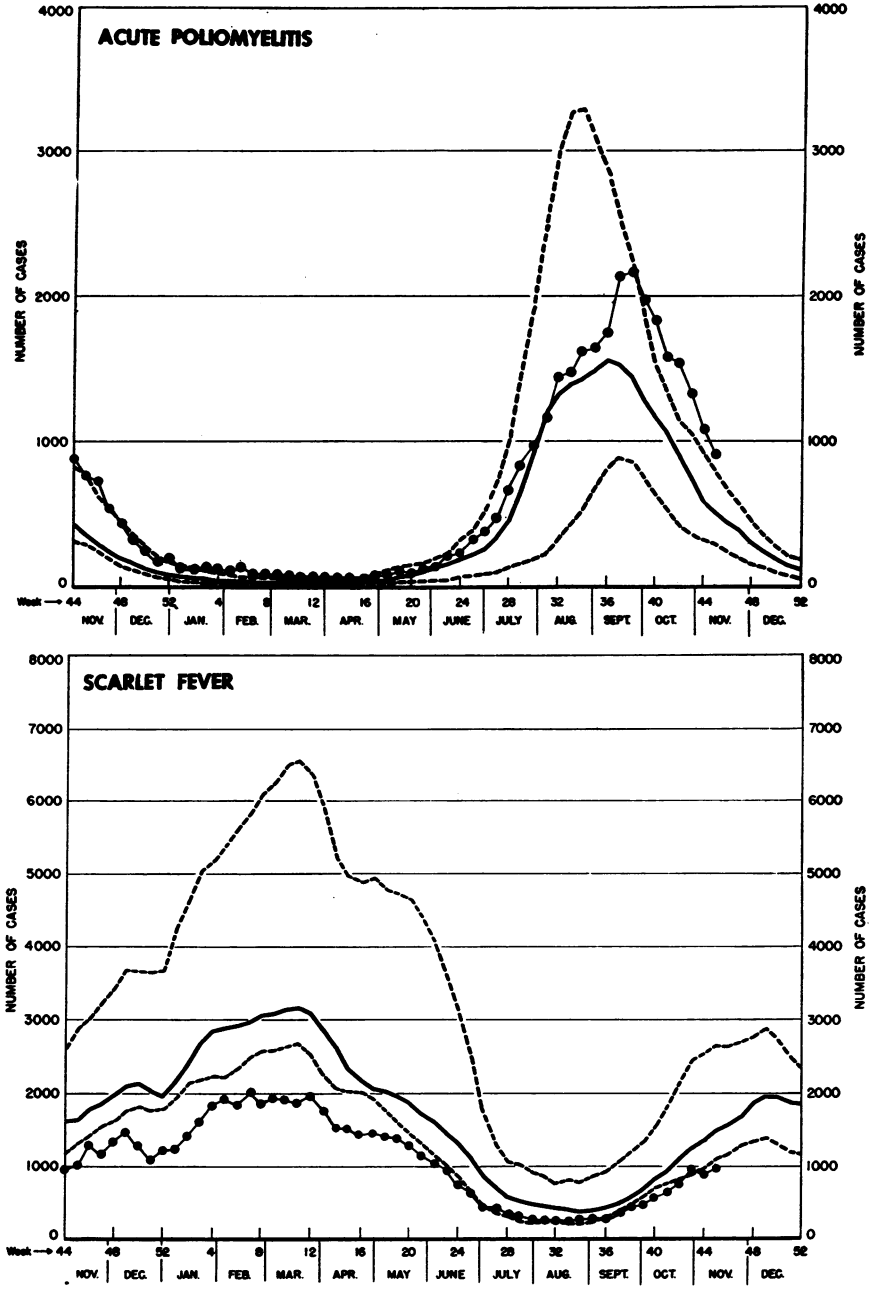
[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	1	996		6	50	1,780	101
New England		89			3	273	
Maine		11			2	39	
New Hampshire		2					
Vermont						17	
Massachusetts		72			1	128	
Rhode Island						32	
Connecticut		4				57	
Middle Atlantic		139			11	315	33
New York		[2] 55			5	105	27
New Jersey		23			1	111	
Pennsylvania		61			5	99	6
East North Central		208		3	6	433	4
Ohio		81			5	84	3
Indiana		15		1	1	81	
Illinois		28		2		39	
Michigan		57				96	1
Wisconsin		27				133	
West North Central		48			4	118	3
Minnesota		7				20	1
Iowa		8				14	2
Missouri		8			2	27	
North Dakota					1	5	
South Dakota						1	
Nebraska		8				14	
Kansas		17			1	37	
South Atlantic		168		1	5	163	13
Delaware		2				2	
Maryland		11				12	
District of Columbia		2				9	
Virginia		33				70	3
West Virginia		16			2	21	
North Carolina		65		1	2	29	
South Carolina		13				6	5
Georgia		23			1	11	4
Florida		3				3	1
East South Central	1	121			9	74	21
Kentucky		34			2	40	14
Tennessee		62			4	30	4
Alabama		20			1	3	3
Mississippi	1	5			2	1	
West South Central		52		1	6	167	27
Arkansas		7		1	1	13	
Louisiana		7				18	
Oklahoma		11			2	5	
Texas		27			3	131	27
Mountain		32		1	2	166	
Montana		7				31	
Idaho		4				9	
Wyoming		1				1	
Colorado		10				14	
New Mexico		1			2	2	
Arizona		4				64	
Utah		5		1		45	
Nevada							
Pacific		139			4	71	
Washington		43				10	
Oregon		14				9	
California		82			4	52	
Alaska						4	
Hawaii							

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

Communicable Disease Charts

All reporting States, November 1949 through November 11, 1950



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1950.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Oct. 28, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis				1	5	2	1	1			10
Chickenpox			30	1	110	250	26	90	65	109	681
Diphtheria					6	1					7
Dysentery, bacillary					3	18	4				25
German measles	2				3	59	1	11	12	9	97
Influenza			35				4				39
Measles			7		139	281	13	15	27	107	589
Meningitis, meningococcal					1	4	1			1	7
Mumps			7		65	219	17	73	96	88	565
Poliomyelitis						11	3	1	3	1	19
Scarlet fever	1		4	1	55	37	29	16	59	54	256
Tuberculosis (all forms)	6		8	21	52	32	20	15		13	167
Typhoid and paratyphoid fever					4	2				4	10
Venereal diseases:											
Gonorrhea	10		16	4	71	59	29	18	26	78	311
Syphilis (total)	3		13	6	39	19	3	9	4	8	104
Primary			1		2	5		2	2		12
Secondary					2	2		1		1	6
Other	3		12	6	35	12	3	6	2	7	86
Whooping cough			21	1	61	134	16	6	2	26	267

CUBA

Reported Cases of Certain Diseases—5 Weeks Ended Sept. 30, 1950

Disease	Pinar del Rio	Habana		Matanzas	Santa Clara	Camaguey	Oriente	Total
		Habana City	Total					
Brucellosis						2	1	3
Cancer	1		16	26	27	5	31	106
Chickenpox		1	1				2	3
Diphtheria	1	3	7	4	1		2	15
Leprosy			7		2	3		12
Malaria		1	2			1	7	10
Measles			1	4	1		4	10
Poliomyelitis	1				1			2
Tuberculosis			23	21	17	26	24	111
Typhoid fever	2	8	13	9	17	4	24	69
Yaws							3	3

JAMAICA

Reported Cases of Certain Diseases—4 Weeks Ended Oct. 28, 1950

Disease	Kingston	Other localities	Total
Chickenpox	1	8	9
Dysentery	1		1
Leprosy	1	3	4
Poliomyelitis		1	1
Puerperal sepsis		1	1
Scarlet fever	1		1
Tuberculosis, pulmonary	10	20	30
Typhoid fever	11	49	60
Typhus fever (murine)	1		1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Cambodia. For the week ended October 28, 1950, four cases (1 death) of cholera were reported in Preyveng Province. This is the first report of cholera in that province. The previous report of cholera in Cambodia was for the week ended March 11, 1950.

Plague

Brazil. Plague was reported in the States of Brazil as follows: Alagoas 5 cases, Paraiba 5 cases (1 death), and Pernambuco 4 cases.

Indonesia. Three cases (2 deaths) of bubonic plague were reported for the week ended September 23, 1950, in the airport of Bandoeng, Java. This is the first report since the middle of June 1950.

Union of South Africa. During the period September 29–October 4, 1950, three cases of bubonic plague were reported in Beaufort District, Cape Province. This is a new focus for the disease.

Smallpox

Kenya. Two cases of smallpox were reported in Nyanza for the week ended August 12, 1950.

India (French). Reported cases of smallpox in Pondicherry were 35 and 34 for the weeks ended October 14 and 21, 1950, respectively.

Indonesia. During the week ended October 7, 1950, 29 cases of smallpox were reported in Bandjermasin. For the week ended September 23, 47 cases were reported. Pontianak reported 7 cases (5 deaths) of smallpox for the week ended September 30 as compared with 30 cases (3 deaths) for the previous week. In Bandoeng, Java, four cases of smallpox were reported for the week ended October 21.

For the past few weeks the number of cases reported each week remained constant.

Typhus Fever

Ceylon. One case of typhus fever was reported for the week ended September 23, 1950, in Western Province.

Guatemala. During August, 7 cases of typhus fever were reported in Guatemala.

India. A case of typhus fever was reported in Nagpur for the week ended October 28, 1950. This is the first case that we have a record of in Nagpur.

Venezuela. During August 1950, 11 cases of typhus fever were reported in Venezuela. This is also the number reported for July.

Yellow Fever

Gold Coast. One suspected case of yellow fever was reported for the period October 16–26 in Bogoso.

Venezuela. The cases of jungle yellow fever in Bolivar State reported in PUBLIC HEALTH REPORTS, Nov. 17, p. 1535, are now known to have occurred as follows: October 6, in Argelia and October 10, in La Parida, near Guasipati.

Plague Infection in Hartley County, Tex.

A report dated November 2, 1950, states that plague infection was proved positive for the following specimens: 147 fleas from prairie dog burrows collected October 19, 1950; 130 fleas from prairie dog burrows collected October 20, 1950; and 24 fleas collected October 20, 1950 from 13 *Onychomys leucogaster*, grasshopper mice. These specimens were taken 5 miles southwest of Dalhart in Hartley County. This is the first time that plague has been reported in that county.