Evaluation of Tuberculosis Casefinding by Mass Small Film Radiography

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EVALUATION, by definition, is the process of determining value. Value is a concept that expresses a relationship between expenditure and benefit. In a proposed or actual public health program, benefits are either stated or implied in documents submitted to appropriating bodies or budget directors as justification for expenditures.

There is no theoretical approach to evaluation; it is entirely an empirical process. To evaluate a proposed program and appraise its potential for good or ill, the evaluator has only the past experience of others with which to work. If a program is already operating, the evaluator can draw also from current experiences.

None may argue safely that a program's benefits are too intangible for measurement. Public health programs—indeed all human effort—are in constant danger of becoming pointless exercises in movement unless there is constantly available some method of accurately expressing the relationship of cost to benefit.

This paper reports the results of an evaluation of the radiographic survey tuberculosis casefinding program of the New York State Department of Health in upstate New York. The program was begun in 1948, but, because records for the years 1948–51 were not readily available, results for the years 1952–58 only have been used. To obtain maximum objectivity, this evaluation was made by the executive office of the health department and not by the program's operating staff.

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The Program

Two casefinding methods have been used since the start of the program in 1948, general community surveys and general hospital admissions.

General Community Surveys

Community chest X-ray surveys are initiated by application of a full-time local health officer, who first determines the need for the survey and takes the necessary steps to organize the community. This preliminary work may or may not have the assistance of other official and voluntary agencies. The tuberculosis casefinding bureau of the State health department assigns priorities in the order in which applications for surveys are received.

The casefinding bureau has seven transportable X-ray machines, which take miniature 70-mm. chest X-rays. The bureau provides films, chemicals, and special records. Films are interpreted by chest experts. Five of the machines are in mobile buses. Specially trained photofluorographers operate these units and process the film.

General Hospital Admissions

The second casefinding method is the X-raying of all adults admitted to participating general hospitals. Any nonprofit general hospital with 4,000 or more admissions a year is eligible to enter this program. Ninety-six of the 187 eligible hospitals in upstate New York were

participating in the hospital survey program by the end of 1958.

The tuberculosis casefinding bureau loans photoroentgen equipment to hospitals for this activity. Each hospital submits routine chest X-ray reports to the bureau, which pays the hospital 50 cents for each report. Hospitals with less than 4,000 admissions a year may enter the program by agreeing to use their own equipment to take standard 14- by 17-inch X-ray films; these hospitals are paid $1 for each report.

With both the community survey and general hospital methods, a clinical followup of initial findings is undertaken by the health department, and a "followup" diagnosis is submitted to the State health department by the hospital within 6 months after completion of the survey.

Central Office X-ray Unit

The bureau of tuberculosis casefinding supervises an X-ray unit located in the central office of the health department. This unit takes X-rays of newly hired State employees in Albany, develops all films taken by the mobile units, and performs other assigned tasks.

Evaluation Method

The evaluation study was started by identifying the possible benefits and the epidemiological basis for the health department's tuberculosis program. These were either implied or stated in documents such as the existing program plan, budget justifications, and pertinent legislative enactments.

Epidemiological Assumptions

The mass survey method has utility as a screening device in a normal population only if the following assumptions are true:

- That pulmonary tuberculosis is frequently an unsuspected disease.
- That persons with unsuspected pulmonary tuberculosis constitute a hazard to themselves and an actual or potential hazard to others.
- That tuberculosis suspects found by radiographic screening of a population will receive followup diagnostic study so that true cases will be identified.

These assumptions were accepted by the evaluator. However, if the mass radiographic casefinding programs are found to be not productive, it may be because one or all of these assumptions are not true.

Program Plan

The program plan divides tuberculosis control into three activities: casefinding, isolation, and treatment. These activities derive from three epidemiological conclusions:

- Tuberculosis is an infectious disease caused by a specific agent, the tubercle bacillus.
- Tuberculosis is spread from person to person by exhalation of the specific agent by a person with pulmonary tuberculosis and inhalation of the agent by a susceptible person.
- The most effective control is achieved by containing tubercle bacilli in or eliminating them from persons with pulmonary disease.

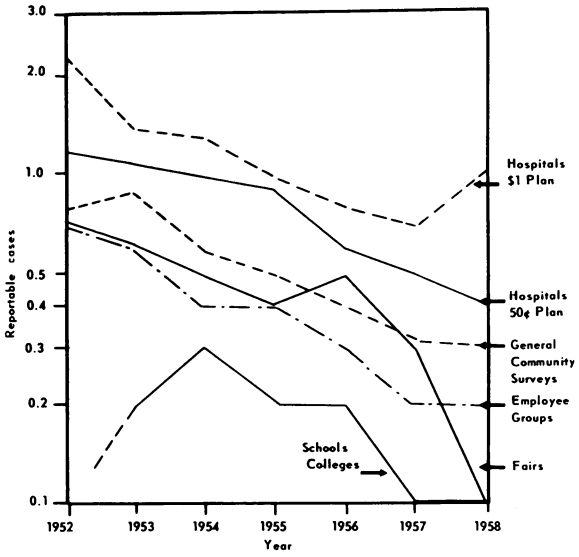
In this evaluation, we did not critically examine these conclusions but accepted them as being in accord with what is presently known about the epidemiology of tuberculosis. They may or may not be true. Each evaluation process must identify these fundamental conclusions so that they are available for review by the executive who is to use the study as a basis for making decisions.

Program Objectives

Epidemiologically, the objective of the tuberculosis casefinding program is the discovery of unreported potentially communicable cases of tuberculosis. This objective is so stated in the program plan. However, casefinding activity bestows no benefit unless the other elements of tuberculosis control—isolation and treatment—are satisfied. For this reason, the contribution of a casefinding activity to the ultimate goal of tuberculosis control cannot be evaluated by examination of the casefinding function alone. Nevertheless, the extent to which mass radiographic surveys contribute to the subordinate goal of casefinding can be determined and evaluated.

The establishment of a casefinding program requires that all casefinding methods in use be considered. When funds are short, the spending of money for mass radiographic surveys implies that other casefinding methods have been rejected. It also implies that the mass survey

Annual number of tuberculosis cases per 1,000 films taken in a mass X-ray survey in upstate New York, 1952–58



is either more efficient than other methods or is the best method of finding a particular class of cases. Discovery of an unsuspected class of cases dictated the selection of mass radiography as a casefinding technique in upstate New York. Other methods of casefinding are directed at suspect persons who either are known to have been exposed to tuberculosis or show evidence of infection or disease.

Measurement Indices

The ultimate objective of mass radiographic casefinding is to discover unknown potentially communicable cases of tuberculosis. Since tuberculosis is a communicable disease and one unknown case may spread the disease to many persons, it is desirable to discover all cases. In practice, however, results must justify effort in terms of total department funds available for all health services. For this reason, the number of cases found is, alone, an inadequate measure of the extent to which the objective is being attained. Results must therefore be measured in terms of cases found per unit of effort.

Before we could determine the number of cases found, it was necessary to define a "case." A case of tuberculosis found on mass survey was defined as one previously unreported and clinically diagnosed 6 months following X-ray as active, activity undetermined (probably active), reportable pleural effusion, or active extrapulmonary tuberculosis. These terms are defined in Diagnostic Standards of the New York State Department of Health and are based on diagnostic standards and classification of tuberculosis promulgated by the National Tuberculosis Association, 1957.

When the evaluation started, only the initial screening film results were routinely reported to the State health department. These findings were classified as probably active, probably inactive, suspect tuberculosis, or negative. Preliminary casefinding yields reflected only the number of probably active cases (by X-ray film diagnosis only) per 1,000 films. Early in the evaluation it became apparent that this was not a valid measure of the number of previously unknown active or communicable cases of tuberculosis being found.

Using the clinical diagnosis established at the end of 6 months' followup as the standard for a true previously unknown active or communicable case of tuberculosis, the specificity of the initial finding "probably active" was found to be only 25 percent, and its sensitivity 53 percent (*1*). "Specificity" is a measure of the probability of a correct positive diagnosis; "sensitivity," of the probability of a correct negative diagnosis. In calculating the sensitivity index, it was assumed that there were no positives in the group classified as negative on initial screening. This, of course, is highly improbable (*2*). The specificity of initial findings varied from survey to survey.

Evaluation should serve as a tool to measure not only the extent to which the predetermined epidemiological objectives are being met, but also to the extent to which fiscal forecasts are being complied with. Therefore, a critical index of performance is the cost per unit of result "because programs all depend upon money for their continued operation" (*3*). The most successful casefinding plan will uncover the largest number of previously unknown cases of tuberculosis per unit of effort. One direct measure of effort is the number of dollars spent. Since budgeting is carried out in a dollar context, we selected as the index of effort expended the number of dollars spent by the official agency. We then related casefinding results to dollars spent. This method also provides a future basis

Table 1. Yield of previously unknown cases of active tuberculosis and variable cost per case found, 1952–58

Year	Number films taken	Active cases found		Variable cost	
		Number	Number per 1,000 films	Total	Per case
1952	388, 012	454	1. 2	$223, 332	$492
1953	388, 408	385	1. 0	227, 668	591
1954	522, 914	414	. 8	239, 077	577
1955	496, 144	345	. 7	258, 250	749
1956	498, 256	260	. 5	264, 187	1, 016
1957	519, 627	223	. 4	272, 304	1, 221
1958	432, 241	187	. 4	269, 513	1, 441

for comparing tuberculosis casefinding performance with other governmental health activities.

Any method of calculating the cost of finding a new case of tuberculosis must provide information which will enable us to decide whether or not there is a proper balance between results and cost. This consideration applies both to the screening program as a whole and to individual surveys within that program. We, therefore, used a cost index which would show the yield of new cases found per 1,000 films.

The first step in calculating the cost index was to determine the annual variable, fixed, and total costs incurred in each casefinding method. The criteria for identifying fixed and variable costs have been described elsewhere (*4*). Briefly, fixed costs are those which are unrelated to the volume of screening activity, such as equipment, and variable costs are those which reflect the volume of screening activity, such as X-ray film.

The second step in calculating the cost index was to determine the number of films taken in each survey, the total films taken during the year, and the corresponding numbers of newly discovered cases.

The computation was carried out by multiplying the number of films taken in a survey by the average variable cost of taking one film that year and dividing the product by the number of cases found by the survey being examined:

$$\text{Cost index} = \frac{\text{Number films} \times \text{average cost per film}}{\text{Number new cases found}}$$

Results

Table 1 shows the number of previously unknown cases of tuberculosis found and the cost per case for each survey year. The number of cases found dropped from 454 in 1952 to 187 in 1958. During this 7-year period, the average variable cost of finding a previously unknown case increased from $492 to $1,441. This was primarily the result of declining yields, the variable cost factor being relatively stable.

Table 2 shows the annual variable cost—total and per X-ray—for the community and hospital admission survey programs for the period 1952–58.

Table 2. Total variable costs and variable costs per film, mass radiographic survey program, upstate New York, 1952–58

Year	General community surveys		Hospital admission surveys			
			Large hospital program		Small hospital program	
	Total variable cost	Variable cost per film	Total variable cost	Variable cost per film	Total variable cost	Variable cost per film
1952	$94, 213	$0. 53	$110, 222	$0. 50	$18, 897	$1. 00
1953	93, 147	. 63	106, 530	. 50	27, 991	1. 00
1954	93, 148	. 35	110, 894	. 50	35, 035	1. 00
1955	100, 856	. 45	116, 440	. 50	40, 955	1. 00
1956	103, 047	. 48	120, 612	. 50	40, 528	1. 00
1957	110, 421	. 47	120, 410	. 50	41, 473	1. 00
1958	117, 320	. 69	109, 741	. 50	42, 452	1. 00

The average cost figures masked considerable variations in performance; these became apparent when one type of survey was compared with the others.

Various specific rates were applied to delineate further the differences in results of the various types of surveys used in the program. However, specific rates were compiled for such factors as the "captive" or "voluntary" character of the groups screened, the population size of the incorporated area in which a survey was held, and the form of local health administration requesting and selecting the area to be surveyed. This was done to determine whether any association could be found between the factors involved and higher casefinding yields. Such associations could then be translated into concrete administrative recommendations. However, the interpretation of such associations still requires that the facts be related to the whole theory of the natural history of the disease.

Table 3 and the chart present a summary of the findings classified by type of population surveyed.

Surveys of school and college groups have

Table 3. Number of new cases of tuberculosis found, number per 1,000 X-ray films taken, and variable cost per case, by type of population screened, upstate New York mass radiographic casefinding program, 1952–58

Year	General population			Agricultural fairs			Schools and colleges		
	Cases found		Cost per case	Cases found		Cost per case	Cases found		Cost per case
	Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films	
1952	110	0. 8	$663	6	0. 7	$745	0	0. 0	[1]
1953	95	. 9	741	4	. 6	979	2	. 2	$4, 161
1954	110	. 6	610	6	. 5	667	3	. 3	1, 308
1955	85	. 5	915	4	. 4	1, 043	3	. 2	1, 881
1956	70	. 4	1, 279	4	. 5	935	2	. 2	3, 090
1957	46	. 3	1, 359	2	. 3	1, 642	1	. 1	5, 943
1958	37	. 3	2, 189	1	. 1	4, 652	1	. 1	6, 552
Total	553	. 5	939	27	. 5	1, 043	12	. 2	3, 275

Year	Employees			General hospital admissions					
				Large hospitals			Small hospitals		
	Cases found		Cost per case	Cases found		Cost per case	Cases found		Cost per case
	Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films	
1952	16	0. 7	$815	277	1. 2	$397	45	2. 4	$420
1953	10	. 6	1, 079	236	1. 1	450	38	1. 4	737
1954	22	. 4	820	228	1. 0	486	45	1. 3	779
1955	11	. 4	1, 185	201	. 9	579	41	1. 0	1, 000
1956	2	. 3	1, 856	149	. 6	809	33	. 8	1, 228
1957	21	. 2	1, 837	129	. 5	933	24	. 6	1, 728
1958	8	. 2	3, 118	99	. 4	1, 108	41	1. 0	965
Total	90	. 4	1, 369	1, 319	. 8	602	267	1. 1	926

[1] $3,961 expended, no cases found.

Table 4. Number of new cases of tuberculosis found and rate per 1,000 films taken in surveys of New York State employees, by place of employment, 1952–58

Year	Place of employment					
	New York City			Upstate New York		
	Number films taken	Cases found		Number films taken	Cases found	
		Number	Rate per 1,000 films		Number	Rate per 1,000 films
1952	------	------	------	9, 787	3	0. 3
1953	8, 924	13	1. 4	7, 313	2	. 3
1954	------	------	------	270	1	3. 7
1955	------	------	------	10, 056	1	. 1
1956	8, 963	7	. 8	2, 545	0	. 0
1957	------	------	------	------	------	------
1958	------	------	------	10, 276	0	. 0
Total	17, 887	20	1. 1	40, 247	7	0. 2

been the least productive. In the 7 years of the survey, 79,076 films yielded only 12 new cases of tuberculosis at an average cost of $3,275 per new case found.

Declining yields were obtained in surveys of the general population, agricultural fair goers, and employee groups. The 1958 cost of $2,189 to $4,652 for each case found in these groups suggests that more productive results could be obtained if greater care were taken in selecting population groups to be surveyed. This statement has special significance wherever funds for tuberculosis control are limited.

Further exploration for high-yield subgroups within the school and fair populations is impossible because of the small size of the groups available for study and their relative homogeneity. As a consequence, when funds are limited further surveys of such populations must be labeled as unproductive.

The cost of finding a case of tuberculosis by surveying hospital admissions, employee groups, and general populations might be lowered if subgroups with higher yields could be identified. One promising clue to a high-yield group was uncovered when results of surveys of State employees located in New York City were compared with results of surveys of State employees in upstate urban areas. Table 4 shows that the yields in New York City were significantly higher, suggesting that the greater the degree of urbanization, the greater the yield of tuberculosis cases.

A similar analysis of surveys of other employee groups and general populations showed that higher yields are characteristic of both general and employee population surveys in incorporated areas of 80,000 or greater population (table 5). This higher yield was not the result of greater survey activity in urban areas in the earlier years when surveys were more productive, because the difference still exists in

Table 5. Casefinding yields per 1,000 films in employee and general population surveys, upstate New York, by population of incorporated area, 1952–58 and 1957–58

Population	1952–58 [1]						1957–58					
	General population			Employee groups			General population			Employee groups		
	Number films taken	Cases found		Number films taken	Cases found		Number films taken	Cases found		Number films taken	Cases found	
		Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films
80,000 and over	62, 267	53	0. 9	70, 636	43	0. 6	16, 499	11	0. 7	37, 153	12	0. 3
20,000–79,000	341, 736	170	. 5	56, 756	15	. 3	59, 486	22	. 4	29, 796	4	. 1
Under 20,000	644, 901	330	. 5	80, 418	25	. 3	176, 287	50	. 3	42, 009	13	. 3
Total	1, 048, 904	553	. 5	207, 810	83	. 4	252, 272	83	. 3	108, 958	29	. 3

[1] Exclusive of State employee surveys.

Table 6. Casefinding yields in three general hospitals with separate tuberculosis service, 1952–58

Year	Number X-rays taken	Number cases found	Yield per 1,000 films
1952	24, 016	44	1. 8
1953	25, 482	51	2. 0
1954	24, 529	47	1. 9
1955	26, 372	66	2. 5
1956	26, 057	46	1. 8
1957	24, 478	46	1. 9
1958	21, 646	35	1. 6

the yield data for 1957–58. The yields are, however, lower in all population size classes, an effect of the yearly decrease in number of cases found. There was no observable difference in yield between the 20,000 to 79,000 population class and areas of less than 20,000 population (table 5).

The screening of hospital admissions showed the same association between population and yields of tuberculosis cases as analysis of results of surveys of other groups. Large hospitals located in incorporated areas of 80,000 or greater population gave consistently higher yields. Three hospitals in metropolitan areas gave sustained yields of 2 new cases per 1,000 X-rays. All three hospitals had wards devoted to the care of tuberculosis patients. Although screening films were not taken on persons admitted to the tuberculosis service, it was felt that there might be a tendency by physicians in these hospitals to admit tuberculosis suspects to the general wards. Therefore, these three hospitals were treated separately (table 6).

Table 7 shows the yields of tuberculosis cases for each population size class for hospitals participating in the program, exclusive of the three with tuberculosis wards. Casefinding was twice as productive in cities of 80,000 or over population as in areas with less than 20,000 population. The smaller hospitals, those participating in the $1 reimbursement program, showed the same association between urban location and higher yield of cases (table 7).

Other factors explored were the type of local

Table 7. Casefinding results for two hospital reimbursement programs, by population of incorporated area of hospital location

Year	Population								
	80,000 and over			20,000–79,000			Under 20,000		
	Number films taken	Cases found		Number films taken	Cases found		Number films taken	Cases found	
		Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films
	50-cent reimbursement program, 1952–58 [1]								
1952	120, 752	152	1. 3	40, 599	43	1. 1	35, 078	38	1. 9
1953	109, 167	122	1. 1	45, 596	29	. 6	32, 815	34	1. 0
1954	104, 780	103	1. 0	54, 166	42	. 8	38, 313	36	. 9
1955	115, 892	91	. 8	50, 997	31	. 6	39, 617	13	. 3
1956	115, 457	70	. 6	55, 520	12	. 2	44, 191	21	. 5
1957	115, 729	61	. 5	49, 417	11	. 2	51, 197	11	. 2
1958	101, 092	37	. 4	62, 596	19	. 3	34, 149	8	. 2
	$1 reimbursement program, 1957–58								
1957	3, 238	7	2. 2	18, 034	9	. 5	20, 201	8	. 4
1958	2, 900	9	3. 2	9, 635	5	. 5	26, 283	27	1. 0

[1] Does not include 3 general hospitals with specialized facilities for the care of pulmonary tuberculosis.

health organization initiating and planning the surveys, the frequency with which areas were surveyed, and the age distribution of the cases found. Only the last analysis provided information of administrative value. The existing policy arbitrarily called for the screening of all persons 15 years of age or older. Data from the hospital admission programs showed that X-ray films on persons over age 25 would be significantly more productive. In 1958 the yield of cases for males aged 15–24 was 0.2 per 1,000 (9,050 films) and for males aged 25–34 was 1.0 per 1,000 (11,510 films). The corresponding yield for females aged 15–24 was 0.1 per 1,000 (45,198 films), and for those aged 25–34, 0.3 per 1,000 (50,961 films).

Use of Data by Administrator

The data on radiographic screening experience were collated to develop a system which could be used to predict the most worthwhile future activities in tuberculosis casefinding. Data were analyzed from a series of surveys similar to those which would ordinarily be contemplated for the future. These data provide a measure of the probability of finding cases of tuberculosis by each class of survey and can be used to predict trends and yields (*5*).

The trend data tell us that a continuation of the program in its present form will probably result in a casefinding yield of less than 0.3 cases per 1,000 films. Considered in the context of the dollar value of the mass X-ray screening system, such a prediction can be considered as an indication for discontinuance of much of the program. However, to make this decision, one must know how many cases can be found by some alternative method for an equivalent expenditure of funds. Such knowledge is not available as a result of this evaluation, and we cannot logically make such a decision (*5*).

The study also predicts that, if we confine our survey activity to incorporated areas of over 80,000 population and discontinue surveys of persons under age 25, school populations, and upstate State employees in all areas, the resulting higher yield will be about 0.5 cases per 1,000 population. The development and use of such a predicting system require regular reporting of results and costs. By comparing our predictions with observed results we will be able to check the validity of the predicting system.

Table 8. Percentage of unknown cases of tuberculosis found by various casefinding methods, upstate New York, 1958

Method	New cases	
	Number	Percent of total cases
Hospital admission X-rays	140	7.0
Community surveys	47	2.4
Other methods	1,649	83.6
Reported at time of death	136	7.0
Total	1,972	100.0

The results of the predicting system developed by the evaluation study were presented to the State health officer, who is responsible for making decisions. It was at this level that the evaluation process was completed.

The State health officer reviewed the theoretical basis for the program as stated in the report. He also considered the soundness of the view that tuberculosis is spread on an exogenous basis. He next considered the findings of the probability predicting system in view of his own individual value system. He gave the program operator full opportunity to discuss the results of the study and then made the following decisions, in accordance with the predicting system findings available at this particular time and place:

- Surveys of students, upstate State employees, persons residing in areas with less than 20,000 population, and persons under age 25 will be discontinued.
- Some photofluorographers and equipment no longer needed to carry on the program will be discontinued or shifted to other public health programs.
- Surveys in areas of over 80,000 population are to be intensified.
- A reporting system using valid measures of achievement will be inaugurated to measure future progress.

These decisions were wholly acceptable to the tuberculosis program directors.

The following decisions were made contrary

to the findings of the predicting system, presumably on the basis of other values foreign to the casefinding objective. The apparent reason for each decision is given in parentheses.

- Surveys of persons at the State fair will continue (for publicity purposes, not casefinding).
- School teachers will continue to be surveyed regardless of higher cost and because of legal responsibility (policy of the State education department that this be provided as a service).
- The central office X-ray equipment used primarily for the examination of upstate State employees is to be retained (equipment needed in part to process survey films and for demonstration and experimental purposes).

Just as the decisions made as a result of the evaluation study are influenced by other values, the interpretation of the evaluation results is influenced by other sources of pertinent information. The best illustration of this is the realization that the radiographic casefinding program uncovered only 187 cases of tuberculosis in 1958 at a cost of $269,513. The total number of new cases of tuberculosis in the same year was 1,972. This means that the program being evaluated found less than 10 percent of the total cases. In comparison, 136 cases were reported for the first time at the time of death (table 8).

Summary

Evaluation of a public health program requires that a predicting system be devised and made a continuing part of the program. The application of such a system to a tuberculosis casefinding program in upstate New York produced the information that yields of cases found by mass X-ray surveys are low and will continue to decline.

No decision could be made on the basis of the dollar value of the mass X-ray screening system unless a similar study were made of all other casefinding methods. Adjustments were made within the program on the basis of the associative predictions and upon an unquantitated value system characteristic of the New York State Department of Health.

Less than 10 percent of all new cases of tuberculosis discovered in 1958 were found by the radiographic screening method at an average variable cost of $1,441 per case found.

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Smith Appointed Assistant Surgeon General

Dr. Clarence A. Smith became chief of the Communicable Disease Center, Atlanta, Ga., July 1, 1960, with the rank of Assistant Surgeon General. The deputy chief of the center since 1957, Dr. Smith succeeds Dr. R. J. Anderson, who has been appointed deputy chief of the Bureau of State Services, Public Health Service.

An officer in the commissioned corps of the Public Health Service since 1937, Dr. Smith became assistant chief and chief of the Service's Venereal Disease Control Division in Washington after serving as venereal disease control officer in Chicago.

films

Public Health Nursing In Communicable Disease Control

35-mm. filmstrip, color, silent, with printed guide, 49 frames, cleared for television, 1960. (Order No. F–417.)

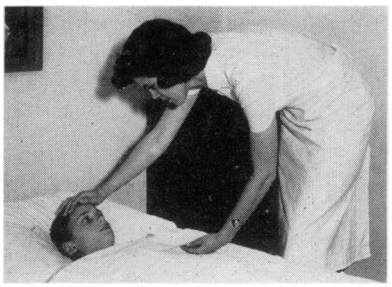
Audience: Graduate nurses.

The role of the public health nurse in the control of communicable diseases is explained. Her activities and responsibilities to the patient, family, community, physician, public health agency, and to herself are depicted.

How To Observe Nursing Activities

16-mm. filmograph, black and white, sound: part 1, 14 minutes, 12 seconds, 512 feet; part 2, 9 minutes, 43 seconds, 350 feet; 1960, cleared for television. (Order No. FG–315.)

Audience: Personnel in hospital nursing services and schools of nursing.



For use as an aid in planning nursing activity observation, this two-part film is based on and is to be used in conjunction with an accompanying manual "How to Observe Nursing Activities in a Patient Unit."

The film is divided for the convenience of the instructor in scheduling planning sessions. Part 1 describes a nursing activities study and explains how any nurse may be trained to observe these activities. Part 2 illustrates those services which are difficult to identify because their purpose is not apparent.

Listeriosis

35-mm. filmstrip, color, silent, with printed guide and text, 45 frames, 1960, not cleared for television. (Order No. F–399.)

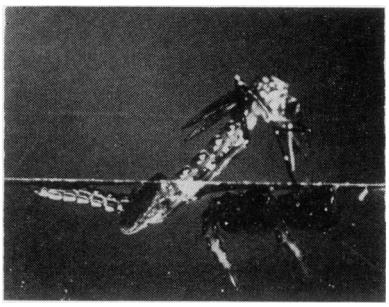
Audience: Physicians, veterinarians, and medical bacteriologists.

This filmstrip is a resume of the diagnostic characteristics of listeriosis from a clinical and bacteriological viewpoint. The text includes a description of the ecology and therapy of the disease in man and animals.

Biology and Control of Domestic Mosquitoes

16-mm. motion picture, color, sound, 21 minutes, 782 feet, cleared for television, 1960. (Order No. M–357.)

Audience: Public health personnel engaged in vector control, students of public health, municipal and local public health officials, civic and service groups, and television audiences.



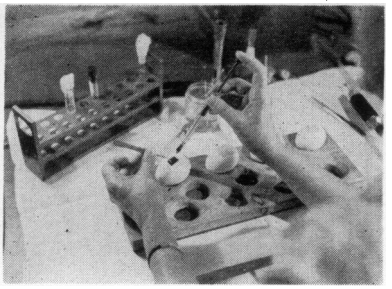
This film is designed to train public health personnel and students as well as to induce the cooperation of individuals and organized groups of persons in the control of domestic mosquitoes.

Techniques of Laboratory Diagnosis of Influenza

16-mm. motion picture, black and white, 17 minutes, 600 feet, 1960, cleared for television. (Order No. M–368.)

Audience: Laboratory technicians.

A revision of "The Laboratory Diagnosis of Influenza," this film explains and demonstrates the procedures step by step which are now recommended for the laboratory diagnosis of influenza. Included are the collection of specimens, isolation

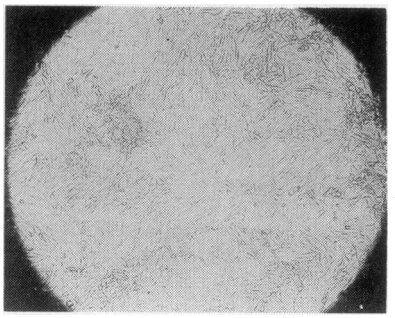


of the virus by intra-amniotic inoculation of chick embryos, rough agglutination tests, titration, hemagglutination tests, and establishment of antibody content.

Introduction to Tissue Culture Techniques

35-mm. filmstrip, color, sound, 51 frames, 8 minutes, cleared for television, 1960. (Order No. F–388.)

Audience: Laboratory directors and advanced laboratory technicians.



An introduction to laboratory practice in the techniques, this filmstrip demonstrates, step by step, the procedures in producing and maintaining a tissue culture, using monkey kidney tissue as an example. The uses of tissue culture are summarized briefly.

These films are available on short-term loan, United States only, from the Communicable Disease Center, Atlanta 22, Ga., Attention: Audio-visual. They can be purchased from United World Films, Inc., 1445 Park Avenue, New York 29, N.Y.