

# Tuberculosis Case Finding in Iowa

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IOWA has a low prevalence and a low incidence of tuberculosis. In 1952 the rate of new active cases reported was 19.1 (per 100,000 population), compared with an average of 55.0 for the continental United States. The mortality rate for tuberculosis was 6.8 (per 100,000 population), compared with 15.5 for the continental United States. The prevalence of active tuberculosis is correspondingly low.

While Iowa is proud of its low rates, the State is of necessity faced with the question of future tuberculosis control efforts. Among these problems is that of the case-finding program of the future—what will its pattern be?

Shall we continue the time-tested methods of contact investigation and long-term followup?

Shall we continue to attempt to X-ray periodically all our adult population, or shall we concentrate on segments of probably high prevalence based on location, occupation, income, or such factors?

What will be the role of tuberculin testing?

Shall we continue the tuberculin testing of school children and other young age groups and follow the associates of the positive reactors?

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Shall we extend tuberculin testing to include adult groups and X-ray the positive reactors?

To help us decide on a plan for the future we decided to study the past and current tuberculosis case-finding program in Iowa. We have analyzed the results of the current State program, and in addition we have attempted through retrospective study to determine how known cases were discovered. We shall report our study in two parts: We shall first present a summary of the current program, and second, an analysis of the reasons for coming to diagnosis of a group of tuberculosis patients.

## The Current Program

Three tuberculosis case-finding programs are currently carried on in Iowa, in which the Iowa State Department of Health participates jointly with the Iowa State Tuberculosis and Health Association and the county tuberculosis associations.

The largest of these case-finding programs, the countywide survey, is a mass X-ray survey program which has been carried out approximately once every 2 years in all counties in which the local health departments have no formal case-finding programs. Counties in which there are cities of more than 30,000 population, and in which tuberculosis case-finding programs are conducted as one of the health department programs, are included in the countywide survey programs by special request.

The second type of case-finding program, known as the contact program, is carried on primarily for the purpose of following known

cases of tuberculosis, their contacts, and also the tuberculosis suspects who have been referred to private physicians by the countywide survey and who have not as yet had decisions regarding the presence of active tuberculosis. The contact programs are scheduled, usually, to take place in counties in which countywide surveys were held the preceding year.

In addition to these two types of programs, X-ray surveys of special groups are carried on throughout the year. These are directed toward county homes and other institutions, to groups of food handlers, to industries, to colleges or other schools, and to small communities not covered by countywide surveys. In some instances the special program consists of 70-mm. film screening only, from which suspects are referred to private physicians for repeat X-rays. In other special groups, such as county homes and State and county institutions, suspects on the 70-mm. film are X-rayed again by the State health department units as is done in the countywide survey and the contact programs.

The 5 mobile units participating in these 3 programs are equipped to take both 70-mm. and 14" x 17" films. Three of the units are owned by the Iowa State Department of Health, and 2 are owned by the Iowa State Tuberculosis and Health Association.

### The Countywide Survey

The countywide survey generally consists of a large-scale appeal to people to accept an X-ray of the chest. An attempt is made to get an X-ray schedule into every home in the county, and, in addition, many persons are X-rayed at their place of work. School children, beginning with the seventh grade, are also included in this program. Persons who are positive to the 70-mm. X-ray are urged to return at a specified time for a 14" x 17" plate. All persons with suspected "tuberculous pathology" are referred to their physicians for confirmation of the diagnosis.

During 1952, surveys were held in 19 counties with an estimated total eligible (15 years and over) population of 293,327. Chest X-rays were performed for 222,441 (75.8 percent) persons. Of this number, 220,409 (99.1 percent)

**Table 1. Results of the countywide chest X-ray surveys, 19 Iowa counties, 1952**

Survey findings	Number	Percent
<i>Film data</i>		
Total 70-mm. films taken.....	222, 441	100. 0
Not recalled for 14" x 17" films.....	220, 409	99. 1
Recalled for 14" x 17" films <sup>1</sup> .....	2, 032	. 9
Total large films taken.....	1, 790	100. 0
Essentially negative.....	493	27. 5
Positive "pathology".....	1, 297	72. 5
Tuberculosis.....	384	21. 5
No tuberculosis.....	913	51. 0
<i>Referrals and confirmed diagnoses</i>		
Total tuberculosis suspects (14" x 17" films).....	384	100. 0
Reported before survey.....	96	25. 0
Primary complex <sup>2</sup> .....	35	9. 1
Referred for followup.....	253	65. 9
Tuberculosis diagnoses confirmed <sup>3</sup> .....	110	100. 0
Active.....	16	14. 5
Questionably active.....	12	10. 9
Inactive.....	77	70. 0
Activity not stated.....	5	4. 5

<sup>1</sup> 242, or 12 percent of 2,032, did not return.

<sup>2</sup> Not reportable.

<sup>3</sup> As of Oct. 1, 1953; represents 43.5 percent of 253.

were not recalled for a 14" x 17" film, and 2,032 (0.9 percent) were recalled for further examination (table 1).

This unusually low percentage of persons recalled for a large film may be partially explained by the fact that persons with readings of suspected nontuberculous chest diseases, with the exception of neoplasm, were not recalled for 14" x 17" films.

It was not considered necessary to recall for a large film those persons suspected from the reading of the 70-mm. film of having cardiovascular abnormalities and other conditions such as thoracic cage anomaly, lung anomaly, and abnormal diaphragm. Instead the film interpretation was reported by letter to the person's physician, and the individual was notified to see him for a report of the X-ray findings.

Of the 2,032 persons recalled for a 14" x 17" film, 1,790 received that type of X-ray, approximately one-fourth (493) were considered essentially negative, and one-fourth (384) as having tuberculosis (see table 1). The remainder, approximately 50 percent, were described as having findings other than tubercu-

losis—findings such as pneumonitis, possible neoplasm, emphysema, and hilar node calcification. Two hundred forty-two persons had confirmatory films taken privately, or did not live in the area, or had moved away.

Of the 384 persons who were considered tuberculosis suspects on the 14" x 17" film, 131 are described as previously known to the health department or not reportable (primary complex). The remaining 253, or approximately 1 per 1,000 persons examined, were referred to the physicians for followup and confirmation of diagnosis of tuberculosis. Among the replies from physicians and among the morbidity reports submitted by physicians, which were matched against the results of the X-ray, were 28 cases of active or questionably active tuberculosis which can definitely be ascribed to the survey as the case-finding mechanism. This is approximately 1 case per 8,000 persons examined.

Toward the end of 1952, queries were mailed from the State health department to physicians who had failed to report on cases referred to them from countywide and contact programs. Queries were sent on 281 cases; 125 answers were received as follows:

Seventy-five stated that patients had reported, were under physicians' care, but did not confirm the diagnosis of tuberculosis.

Ten confirmed the diagnosis.

Forty replied that the patients had not reported to them.

One hundred and fifty-one did not reply. Second letters were not sent to these persons. It appears likely that more cases of tuberculosis existed than were reported on by the physicians.

### The Contact Program

In preparation for a county contact program, records of reported cases or suspects in the county and all information regarding contacts of patients, including the results of previous X-ray readings, are sent by the State health department to the nurse who is to work in the county.

The nurse visits all physicians in the county and obtains their permission to call on cases, contacts, and suspects. She also asks the physician for the names of any persons on his patient

roster who may be suspected of having tuberculosis or for whom he feels an X-ray of the chest would be advisable. The X-ray in this program is a 14" x 17" film since it is considered more of a diagnostic procedure than a screening procedure.

Tuberculin testing of contacts and suspects before the survey is recommended, and the physician is supplied with sufficient tuberculin for this purpose. Some physicians prefer to have their patients receive the 14" x 17" X-ray without prior tuberculin testing.

The results of this program for 1952 are shown in table 2. A total of 2,234 persons received a large film. Of these, over half (53.3 percent) had positive readings; 714 were positive for nontuberculous pathology; and 477 were suspected of having tuberculosis. Most of these persons had previously been reported as having tuberculosis, and of those referred to physicians for diagnosis, 11 were reported as new active cases of tuberculosis.

### Special Group Surveys

Special X-ray programs in 1952 consisted only of the 70-mm. X-raying or screening phase. The names of persons with positive results at screening were referred to private physicians with recommendations for a large film. Records of the results of followup of suspects are not available.

In some programs, such as those conducted in county homes or in mental institutions, all persons with positive 70-mm. X-rays were re-

**Table 2. Results of contact followup program, 44 Iowa counties, 1952**

Results	Number	Percent
Persons receiving 14" x 17" films.....	2,234	100.0
Negative readings.....	1,043	46.7
Positive readings.....	1,191	53.3
No tuberculosis.....	714	31.8
Tuberculosis.....	477	21.4
Previously reported.....	320	
Primary complex.....	16	
Referred to physicians.....	141	
Diagnosis confirmed.....	61	
Active and questionably active.....	11	
Inactive.....	41	
Not stated.....	9	

called to have 14" x 17" films taken. In programs in which recall was included (county homes and the mental institutions), approximately 10 percent of those receiving 70-mm. X-rays were recalled to have the large films taken.

Two active cases of tuberculosis never previously known were discovered by this project. This is approximately 1 active case for each 1,500 70-mm. X-rays taken on persons in county homes and mental institutions. Undoubtedly, these 2 active cases are not the only ones discovered as a result of this survey since approximately only one-third of the 70-mm. films were subject to recall, two-thirds of the suspects had been referred to physicians on the basis of the 70-mm. X-ray, and no record of followup for these groups is available in the State health department.

Tuberculin testing of special groups has been developed and conducted as a special program in case finding. Entire school populations, usually limited to the seventh grade and over, have been tuberculin tested in some areas, and in other areas just selected grades have been tested. All those having positive reactions are X-rayed, and their associates are also examined for the presence of tuberculosis.

We see then that within the limits of reporting by physicians on the results of their follow-

up there were discovered through all these State programs at least 184 new cases of tuberculosis, of which 41 were active or questionably active. It is likely that some cases of tuberculosis diagnosed were not reported back by physicians, and among the 126 cases described as inactive, continued examination will show some to be active.

The 41 active cases may be considered the minimum accomplishment of the case-finding program. It is interesting that these 41 active cases are approximately 8 percent of all the cases of active tuberculosis reported in Iowa during 1952.

We may generalize that at least 8 percent of all the active tuberculosis discovered in the State of Iowa during 1952 was discovered as a result of these statewide case-finding efforts.

### Another Approach

Analyzing the reasons for coming to diagnosis is another way to examine our case-finding program and, of course, is a different approach from the one previously described.

In this analysis we start with the cases diagnosed as having tuberculosis or with the cases admitted to a sanatorium. Then through a retrospective study we attempt to find out what were the reasons which led to the diagnosis of

**Table 3. Reason for coming to diagnosis—patients admitted to Oakdale Sanatorium, Iowa, with active tuberculosis, 1952**

Stage on admission	Symptoms		Contact investigation		X-ray survey		Hospital admission X-ray		X-ray by nurse		Followup of inactive tuberculosis		Other		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Minimal.....	3	30	3	30	1	10	0	0	2	20	1	10	0	0	10	100
Moderately advanced.....	25	51	5	10	8	17	4	8	1	2	4	8	1	2	48	100
Far advanced.....	101	88	4	3	3	3	2	2	0	0	1	1	4	3	115	100
Total active tuberculosis (including 3 "other").....	131	74	12	7	13	7	6	3	3	2	6	3	5	3	176	100
Percent far advanced.....		77		33		23		33		0		17		80		65
Mean age.....	46		26		41		55		28		46		44		44	

tuberculosis. In a way we are trying to discover motivation; that is, what is the underlying cause that gave rise to the chain of events that led to the person presenting himself to a physician or to an X-ray survey to find out if he had tuberculosis.

Data for the cases of tuberculosis admitted to the State sanatorium at Oakdale, Iowa, during the calendar year 1952 are presented in table 3. There were 176 of these cases; 10 were minimal; 48, moderately advanced; and 115, far advanced. We had already noted from the data released by the Public Health Service that the proportion of far advanced tuberculosis is higher for Iowa (52.7 percent) than for any State in the United States (1).

In our study we included factors which would help us to find out why such a large proportion of the new cases in Iowa are in the far advanced stage.

It will be noted that 74 percent of the cases admitted to Oakdale Sanatorium are described as having been discovered because of the person's own index of suspicion. This means that these people presented themselves to physicians for diagnosis because of symptoms which are ordinarily associated with tuberculosis. Contact investigation was the underlying reason for 7 percent, and a similar percentage came to diagnosis because of X-ray surveys.

It is perhaps worth noting that whereas analysis of the Oakdale figures shows that 7 percent of the admissions in 1952 were diagnosed because of X-ray surveys, our previous study showed that 28 cases of active tuberculosis were reported as being discovered in Iowa during 1952 because of the mass X-ray survey (approximately 8 percent of all the cases reported in Iowa). Thus, we note that both analyses tend to give the same result: Between 7 and 8 percent of all the active tuberculosis diagnosed in Iowa is diagnosed because of mass X-ray surveys.

It is also interesting that routine X-raying of all admissions to a general hospital produced 3 percent of the tuberculosis, examination of nurses produced 2 percent, and followup of inactive cases of tuberculosis produced 3 percent.

Of all the cases coming to diagnosis because of symptoms, 77 percent were in the far advanced stage. It is also of significance that

for other designated methods of case finding the proportion in the far advanced stage was never higher than one-third. This means that when we go out and aggressively look for tuberculosis among people who are not symptomatic and who are not going to their physician because of symptoms, two-thirds of the tuberculosis discovered is in a stage prior to far advanced.

We may also wish to consider the age of persons found by these various methods. It will be noted that, except for those found through hospital admission X-ray, the persons motivated by symptoms were the oldest, and those found through contact investigation and followup of student nurses were the youngest. Nevertheless, comparison with the rest of the United States shows that the tuberculosis patients reported in Iowa are not older than the average for the continental United States, according to the Public Health Service (1).

In the United States in 1952, more than 12 percent of the tuberculosis patients reported were of age 65 and over. In Iowa, less than 10 percent were in that age group. Other age groups show no great differences except that in Iowa a slightly smaller percentage of the tuberculosis patients reported was under 5 years of age than in the United States (1.0 versus 3.1).

Here, then, is a partial answer to our question as to why Iowa, with its low morbidity and mortality rate, has such a large proportion of its cases diagnosed in the far advanced stage. Three-quarters of all the cases of tuberculosis diagnosed in Iowa, as judged by the admissions to Oakdale Sanatorium, have come to diagnosis because of symptoms associated with tuberculosis. In other words, their tuberculosis has progressed to a stage where their symptoms are sufficient to arouse suspicion of tuberculosis or at least to motivate them to go to their physician to find out what ails them.

#### Indicators for the Future

What then can Iowa do about this large proportion of cases in the far advanced stage?

In what direction shall our case-finding program of the future be?

In view of the fact that 3 out of 4 patients come to diagnosis because of symptoms, shall we discontinue organized case finding and rely on

people to go to their physician when they are sick?

The answer to the last question is "No."

In Iowa, during 1952, 506 cases of active tuberculosis were reported; if the Oakdale distribution can be applied to these cases, we can say that 26 percent, or 132 cases of active tuberculosis, was found through organized case finding by health department effort. We can assume that most or all of these were benefited by early case finding and that, in addition, the community gained by taking out of circulation so many cases of infectious disease. Our problem is how to keep on removing from their environment this proportion of active cases, or a larger proportion, and to do it as early as possible.

Our case-finding programs of the future then would seem to be:

- ▶ Continued intelligent followup with periodic examination of all suspects and known inactive cases with special reference to cases referred to private physicians.
- ▶ Realistic followup and periodic examination of all contacts of active cases of tuberculosis.
- ▶ Expansion of routine X-raying on admission to hospitals and other institutions.
- ▶ Admission and periodic X-raying of inmates of mental sanatoriums, prisons, and other institutions for long-term care.
- ▶ Continued X-ray surveys of groups and areas of presumably high prevalence, such as the aged, transients, food handlers, overcrowded areas of our cities, and so forth.
- ▶ Preemployment X-raying and periodic examination of industrial groups and others who can have X-ray facilities made readily available.
- ▶ Continued tuberculin testing of students with X-ray of the positives and examination of contacts and associates.

Tuberculin testing of whole communities on an experimental basis with X-raying of all positive reactors would appear to be indicated.

Experience in a few areas would give us valuable information both from an administrative and epidemiological point of view regarding the merit of this method as a case-finding procedure.

### Summary

Two studies were made to evaluate tuberculosis case-finding procedures in Iowa.

One study shows that during 1952 at least 184 cases of tuberculosis, 41 of them active or questionably active, were found by the state-wide program of the State department of health; these were found chiefly through X-raying. This number is approximately 8 percent of the active tuberculosis reported in Iowa in that year.

Another study of the reason for coming to diagnosis shows that approximately 75 percent of all cases of tuberculosis diagnosed in 1952 came to diagnosis because of symptoms related to tuberculosis. X-raying of the public produced 7 percent; contact investigation, 7 percent; and the remainder were found through followup of inactive tuberculosis, X-raying of hospital admissions and staff, and so forth.

Some of the possible reasons for such a large proportion being diagnosed because of symptoms are discussed, and the case-finding program for the future is proposed.

### ACKNOWLEDGMENT

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### REFERENCE

- (1) U. S. Public Health Service: Reported tuberculosis morbidity and other data, calendar year 1952. Washington, D. C., The Service, 1953, 17 pp. Not available for distribution.